

CHAPTER III

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CHAPTER III:

ENVIRONMENTAL CONSEQUENCES

This chapter summarizes existing MNF resource conditions and expected direct, indirect, and cumulative effects of the Proposed Action and other alternatives. Only proposed standards that have the potential to affect a given resource were analyzed in detail.

The analysis in this chapter focuses on significant issues identified in Chapter II and topics the Responsible Official is required by law to address in a decision document. Much of this chapter addresses how, in the context of NEPA and NFMA, proposed changes to the *Forest Plan* would affect various resources. As to NFMA, it identifies how each alternative would affect the achievement of (1) Forest goals that guide MNF resource management (*Forest Plan*, pp. 37-40) and (2) projected outputs (*Forest Plan*, pp. 41-42, and Appendix O). As to NEPA, it explains how *Forest Plan* changes may directly, indirectly, or cumulatively affect multiple resources of the MNF.

The No Action Alternative provides base-line information for the comparison of effects by alternative. Existing *Forest Plan* standards would not be changed under the No Action Alternative; the effects described for the No Action Alternative reflect continued implementation of the existing *Forest Plan* until revision or another amendment is approved. The No Action Alternative reflects the annual average of goods and services that have been provided over recent years under implementation of the existing *Forest Plan*. Goods and services levels shown in the *Forest Plan* were estimates of maximum supply and have not always been reached or produced (*Forest Plan*, Chapter II). Budgets, markets, conflicting resource concerns, etc. have constrained levels of goods and services offered since the *Forest Plan* was approved.

Common to all alternatives are the acres protected for bald eagle, Cheat Mountain salamanders, running buffalo clover, shale barren rock cress, VA spirea, and small-whorled pogonia. Known occurrences of these species (and buffers to protect their habitat) currently affect about 4,500 acres (<0.5% of the MNF). Under all alternatives, regardless of the resource being managed, adverse effects to these species' populations would be avoided during site-specific resource management (Threatened and Endangered Species effects in this chapter). These species' areas of protection are small and generally scattered, and, therefore, are not expected to cause substantial direct, indirect, or cumulative effects to Forest resources or substantially affect the way resources are managed. Their protection and management also are not expected to contribute substantially to past, present, or reasonably foreseeable future actions.

Various issues have the potential to affect the Forest's ability to manage MNF resources. However, the potential outcomes of the recently initiated *Forest Plan* revision, long-term management of inventoried roadless areas, and other issues are not discussed in this chapter. The extent of change for these issues cannot be reasonably predicted at this time, and it would be premature to speculate on outcomes.

THREATENED AND ENDANGERED SPECIES

AFFECTED ENVIRONMENT

Discussions of the general affected environment for the MNF can be found in other sections of this chapter. The following are the goals and direction that guide management of threatened, endangered, proposed, and sensitive species of the MNF in conjunction with the Forest's overall wildlife program.

Forest Goals

Manage habitat to help recovery of threatened and endangered species on the Forest. Protect sensitive and unique species until their populations are viable. Improve the diversity of plants, animals and stand condition (Forest Goal IV, *Forest Plan*, p. 37).

Cooperate with, and coordinate plans with, other Federal, State, and local agencies and with private groups to improve the management of natural resources and reduce potential conflicts (Forest Goal XIII, *Forest Plan*, p. 39).

Management will protect or enhance habitat for threatened and endangered species and consider the needs of species identified as special or unique (Forest-wide general direction, *Forest Plan*, p. 84).

Forest Service policy (FSH 2670 and FSH 1950) encourages threatened, endangered, and sensitive species be protected to prevent the loss of species viability

To accomplish these goals, the *Forest Plan* identified Forest-wide standards to guide threatened, endangered, proposed, and R9 Forester's Sensitive Species management across the MNF (*Forest Plan*, pp. 50, and 84-87, 179a, 230-234). Protection of MNF threatened, endangered, proposed, and sensitive species is primarily guided by these 2670 Forest-wide standards; however, threatened, endangered, proposed, and sensitive species also may receive protection via the implementation of other resource standards (Forest-wide, Management Prescription, and Zoological Area standards) that protect or restore-

- Seeps and bogs (*Forest Plan*, pp. 62, 111, 123, 136-137, 149, and 178).
- Soils, streams, and riparian habitat (*Forest Plan*, pp. 62-63, 69a, 79-82a, 112, 124-124a, 138-138a, 150, 179-179a, 188-188a, Appendix R, and Appendix S).
- Caves (*Forest Plan*, pp. 67 and 230-234).
- Special areas (e.g. scenic, botanical, zoological, national natural landmarks, protected streams, research natural areas) (*Forest Plan*, pp. 69, 198-199, and 210-230).
- Special interest areas (historic, archaeological, and cultural resources; potential Wild and Scenic Rivers; etc.) (*Forest Plan*, pp. 70-71).
- Wilderness (*Forest Plan*, pp. 153-163).

The *Revised Biological Assessment* documents potential effects of continued implementation of the *Forest Plan* on the following nine federally listed threatened and endangered species of the MNF: bald eagle (*Haliaeetus leucocephalus*), Cheat Mountain salamander (*Plethodon nettingi nettingi*), Indiana bat (*Myotis sodalis*), VA big-eared bat (*Corynorhinus townsendii virginianus*), WV northern flying squirrel (*Glaucomys sabrinus fuscus*), shale Barren rock cress (*Arabis serotina*), VA spiraea (*Spiraea virginiana*), running buffalo clover (*Trifolium stoloniferum*), and the small-whorled pogonia (*Isotria medeoloides*). Findings in the *Revised Biological Assessment* were reviewed by the USFWS and a subsequent *Biological Opinion* was issued (USFWS 2002). Detailed information regarding the affected environment for threatened and endangered species on the MNF is in the *Revised Biological Assessment*, the USFWS *Biological Opinion* (Appendix D), and the Biological Evaluation (Appendix G) for this analysis.

A synopsis, of the affected environment for threatened and endangered species on the MNF follows.

Bald eagle - Breeding most often occurs within one mile of the water bodies that provide the primary food sources (USFWS, 1990). Nests are built in super-canopy trees, approximately 100 yards from the nearest forest edge (Cline, 1985). Overall, bald eagles prefer areas with limited human activities (Buehler et al., 1991).

Ten active eagle nests exist in WV as of 1999. One nest, discovered in 1987, is in the Smoke Hole area of the MNF, along the South Branch of the Potomac River, in a 6.2 MP. This nest site, which is in the Chesapeake Bay recovery region, has steep slopes and a closed canopy forest predominated by deciduous

trees and some white pines. The nest is well buffered from the river by mature forest and can only be seen from a 0.25-mile stretch of the river

The MNF Smoke Hole area provides good forage and nest habitat. Although the MNF has no large lakes or impoundments, smaller lakes, such as Buffalo Lake, Summit Lake, Spruce Knob Lake, and Lake Sherwood, provide potential habitat. These lakes may be used primarily by non-breeding eagles traveling south from northeastern breeding areas, or north from southern breeding areas (USFWS 1990). Larger river corridors, such as the South Branch of the Potomac, also provide potential nesting and feeding areas.

Cheat Mountain salamander - Cheat Mountain salamander survival requires microhabitats with high relative humidities or moisture (Feder, 1983, Feder and Pough, 1975) and acceptable temperatures. Cheat Mountain salamander occurs in red spruce forest types (*Picea rubens*) with a yellow birch (*Betula alleghaniensis*) component, or in mixed deciduous forest types (Green and Pauley 1987), between 805 m (2641 ft) (Pauley and Pauley, 1997) and 1482 m (4860 ft) (Pauley, 1999) elevations. Refugia such as rocks or rotten logs are important for reproduction (Green and Pauley, 1987). Vegetative structure also affects salamander populations. Old stands provide dense litter layers, abundant woody debris, and stratified canopies, which all enhance moisture retention (Pentranka et al., 1994) and limit moisture and temperature variations in the forest floor

Cheat Mountain salamander is a relict species of 59 disjunct (Pauley and Pauley, 1997) and genetically isolated populations (Kramer et al., 1993). Historically, the range of Cheat Mountain salamander was likely more extensive than it is today. Known and potential range distributions of Cheat Mountain salamander populations on the MNF have been delineated on USGS topographic maps by Dr. Thomas K. Pauley of Marshall University, the leading authority on the life history and range distribution of the Cheat Mountain salamander.

The extensive logging of spruce around the turn of the century is the most likely the cause of decline for this species. Competition from other similar plethodontids, genetic isolation of populations, habitat degradation (e.g., acid deposition), habitat fragmentation, and habitat disturbance all continue to contribute to the limited occurrence of the Cheat Mountain salamander (Pauley 1980,1991).

Indiana bat – Current *Forest Plan Zoological Area* standards for endangered bats on the MNF provide guidance for management of hibernacula; maternity colonies; land within 200 feet of hibernacula entrances and maternity colonies; and a forested travel corridor 330 feet wide between cave entrances and foraging areas.

Hibernacula: Indiana bats winter in limestone caves or mines that satisfy their highly specific needs for cold temperatures during hibernation. Monitoring indicates that populations are decreasing in portions of their core range (USFWS, 1996), but not in WV, where estimated populations have been increasing since the early 1980's (Endangered Species Federal Assistance Performance Reports, WVDNR 1981-2000). Most significant caves are gated or fenced, which has protected populations and likely has been responsible for their increases (Wallace, 1999). In the last decade, WV has seen a 45% increase in the number of hibernating Indiana bat (Wallace pers. comm. 1999). Total numbers of Indiana bat in the state are approximately 10,658 (Stihler and Wallace 1999). This represents 3% of the entire hibernating population range-wide.

Approximately 26 WV caves provide adequate Indiana bat winter hibernacula; five of those caves are on the MNF. Populations from 1-210 individuals have been recorded in the five MNF caves.

Hellhole, a privately owned cave in Pendleton County, is the only WV cave currently designated Critical Indiana bat Habitat (Priority Two) (USFWS, 1996); it lies within the MNF's Proclamation Boundary, but on private land approximately one mile from National Forest land. Use of Hellhole has been on a steady

increase for the past 16 years. In 1983-84, this cave wintered only 210 Indiana bat. In March 1999, this cave held 8,548 of the state's estimated 10,658 Indiana bat population.

The majority of WV's known Indiana bat hibernacula are closed to public use. Cave Hollow/Arbogast Cave is gated with a year-round closure order. Two-Lick Run Cave is signed as closed and Big Springs Cave is gated from September 1 to May 15.

Summer Roosting Habitat: During the summer, individuals or maternity colonies roost in trees with cavities or exfoliating bark and forages in riparian and upland forests (USFWS, 1998). No female Indiana bats or known maternity colonies have been located during the summer within the MNF proclamation boundary, but male Indiana bats have been found in the proximity of the hibernacula during this time period. Indiana bat males have been found to forage and day roost near hibernacula (within 3.5 miles, or 5.6 km) throughout summer. Local data indicate Indiana bat males often switch roost trees from day to day, roosting in trees near ridge tops. Based on this data, a five-mile radius around hibernacula is considered habitat for those Indiana bat that remain around the caves in the summer, mostly males as far as we know and for fall swarming activity for both sexes.

Romme et al. (1995) presents five variables that determine roosting habitat (percent canopy cover, mean diameter of overstory trees, density of potential live roost trees >8.7 inches dbh, density of snags >8.7 inches dbh, and percent understory [or understory crown density]) and describes the values of these variables that make the most suitable Indiana bat habitat. The optimal canopy cover for roosting Indiana bat is 60-80%. The abundance of snags indicates current roosting value, so the more snags the better.

Tree structure, specifically the availability of exfoliating bark with roost space underneath, is a critical characteristic for roost trees. Roost site suitability is determined by 1) tree condition (dead vs. living), 2) loose bark availability, 3) solar exposure and relative location to other trees, and 4) spatial relationship to water and foraging areas (USFWS, 1999).

Indiana bat have been found to show strong fidelity to roost areas, however individual roost trees are naturally ephemeral, and may be available for a short period of time (Gardner et al., 1991 and Humphrey et al., 1977). Tree removal does not discourage Indiana bat from using dead trees nearby as roosts; and in fact may make them more attractive by allowing more warming by solar radiation (USFWS, 1999).

Indiana bat use isolated trees in openings as roost trees (Kurta et al, 1993), and they may switch between shaded and unshaded roost trees depending on weather conditions (Callahan et al, 1997 and Kurta et al, 1996) and physiological requirements associated with thermal regulation.

Potential roosting habitat, both maternity and nonmaternity, is widely available on the Forest because the MNF is 97% forested with 81% of the forest over 60 years old. About 7% of the forest is over 105 years old. Given the average growth rates on the MNF, the stands that are over 60 years old, most likely have a mean diameter of around 11 inches dbh, well over 8.7 inches, needed for quality roosting habitat. Trees exhibiting roosting characteristics, such as shagbark and bitternut hickory, red and white oak, sugar maple, white and green ash, and sassafras, are plentiful throughout the Forest. Snag abundance will not reach optimum levels on the MNF for several years, when the trees begin reaching the end of their life span. Mature forests have been commercially thinned, regenerated, or selectively harvested to create the more open forest canopies that provide quality habitat for Indiana bats (USFS, 2001). Standing dead trees and large, overmature trees which Indiana bats may use as roost trees are abundant across the forest.

Indiana bat maternity roosts: WV is within Indiana bat's eastern maternity range, but not within its core, and does not have confirmed maternity colonies. Despite extensive summer surveys throughout WV, especially in and around the MNF (*Revised Biological Assessment*, Appendix 6), Indiana bat maternity roosts have not been found. Presumably, reproductive female bats are more constrained by thermoregulatory and energy needs than are males and nonreproductive females (Cryan et al., 2000).

Nighttime temperatures on the MNF are thought to be too cold to support maternity colonies (Stihler and Tolin, pers comm 1999).

Summer Foraging Habitat: Indiana bat forage nightly for terrestrial moths and aquatic insects, primarily in upland forests and riparian woodlands. Riparian areas provide important foraging habitat and travel corridors. Indiana bat prefer to forage within upper forest canopy layers where overstory canopy cover ranges from 50-70%. Indiana bat are also known to forage along forest edges, in early successional areas, and along strips of trees extending into more open habitat, but drinking water must be available near foraging areas (Romme et. al., 1995). Potential foraging habitat is widely available on the MNF. Large open pastures or croplands, large areas with <10% canopy cover, and stands with large unbroken expanses of young (2-5-in dbh), even-aged forests are avoided or are rarely used for Indiana bat foraging (Romme et al., 1995) (MacGregor, 1999).

Fall Swarming Habitat: Indiana bat begin swarming as early as August and through October or November, depending upon local weather conditions. Swarming entails congregating around hibernacula prior to hibernation, flying into and out of cave entrances from dusk to dawn (Kiser and Elliot, 1996). This is a biologically important period because during this time bats mate and replenish fat reserves prior to hibernating (USFWS, 1983). The MNF provides approximately 252,000 acres of swarming habitat within five miles of known hibernacula, most of which is forested. Of these acres approximately 56,000 acres are designated Wilderness (MP 5.0), semi-primitive, largely natural, undisturbed areas (MP 6.2) and zoological areas (MP 8.0) that provide sufficient protections to the Indiana bat. Approximately 583,000 acres of private lands fall within five miles of known hibernacula.

Radio telemetry studies conducted near Big Springs Cave on the Fernow Experimental Forest (located within the MNF) (Stihler, 1996) provide local data about roost trees and foraging habitats used by Indiana bat during fall swarming. Indiana bats appeared to forage primarily in wooded habitats including riparian zones. Roosts were usually in dead trees, dead portions of live trees, or in live shagbark hickories. Some species that were used as day roosts during this study were, larger-diameter (>10 inches dbh) black cherry, shagbark hickory, slippery elm, white ash, and yellow poplar trees.

Virginia big-eared bat - Current *Forest Plan Zoological Area* standards provide guidance for management of hibernacula; maternity colonies; land within 200 feet of these inhabited caves; and a forested travel corridor 330 feet wide between cave entrances and foraging areas.**

VA big-eared bat is a geographically isolated and sporadically distributed cave obligate species. They use caves during both summer and winter. These caves typically are located in karst regions dominated by oak-hickory or beech-maple-hemlock associations. They forage in patchy mosaic habitats (USFWS, 1984). WV holds its largest populations, particularly Pendleton County (Barbour and Davis, 1969; Stihler pers. comm., 2000). WV's Cave Mountain Cave, Hellhole, Hoffman School Cave, Sinnit Cave, and Cave Hollow/Arbogast Cave are designated as "Critical Habitat" for this species based on the precise physical structure, temperature, and humidity conditions required for its continued survival, as well as the significant number of VA big-eared bat that occur there. Cave Mountain and Cave Hollow/Arbogast are on the MNF.

Hibernacula and Maternity colonies: Cave-dwelling bats are particularly at risk due to human disturbances. Cave Hollow/Arbogast Cave is the largest maternity colony sites on the MNF, and it is also a hibernaculum. As designated Critical Habitat by the USFWS, it is closed year round to public entry. Cave gates were installed on four known Forest Service entrances and 1 private entrance to this cave

** Zoological standards for VA big-eared bats standards are identical to existing Indiana bat standards.

system in 1996. Cave Mountain, also designated as Critical Habitat, is used as a maternity colony site. It is closed to the public from April 1 through September 1, and opened in winter. Rebar style gate closures were replaced in 1995 with angle-iron gates. Peacock Cave is a VA big-eared bat hibernaculum and maternity cave. It is isolated and signed for year-round closure. The entrance is extremely small and currently not gated. Gating would be a last resort since gate installation could affect airflow and microclimate at such a small entrance. WVDNR data have indicated no population problems from human disturbance in this cave. In fact, maternity colony populations have increased since 1983.

The habitat surrounding the VA big-eared bat caves on the MNF is very diverse - the majority is in private ownership and agricultural use. Other known land uses in this area are timber harvesting, strip mining, limestone/rock quarries, two commercial caves, as well as Canaan Valley State Park, Blackwater Falls State Park, Canaan Valley Wildlife Refuge. The National Forest land around VA big-eared bat caves is all forested with the exception of a very small percentage of wildlife openings and several range allotments. The majority of the forested acres are over 60 years old.

Summer Foraging: VA big-eared bat feed predominantly on moths (Dalton et al. 1986, Sample and Whitmore 1993). Based on local research, VA big-eared bats travel up to six miles from their caves to forage (Stihler 1995). Recent clearcuts and grazed land were not used. One radio-tagged bat traveled directly from the cave to unmowed hayfields where it foraged for about two hours, after which it night roosted for another one to two hours. Following night roosting, the bat spent most of its time in wooded areas, especially a small wooded ravine west of the hayfields. The study was continued in late July 1992, and while foraging occurred in both wooded and open habitats, wooded habitats were used more than in 1991. During both studies, bats rarely returned to the cave during the night, even in July when females had young remaining in the cave (Stihler 1994). Timber harvesting, water quality degradation, stream channelization, and other actions potentially could alter foraging habitat in some cases (Grindal 1996).

WV northern flying squirrel - This species inhabits northern hardwood forests that contain a conifer component. Lowest recorded elevation is 2860 feet (Stihler et al, 1995; Tolin pers comm).

Prior to completion of the Recovery Plan in 1990, WV northern flying squirrel management on the MNF was conducted in accordance with the 1986 *Forest Plan* Forest-wide Standards and Guidelines, and more specifically Appendix X, *Interim Standards For the Virginia Northern Flying Squirrel* (*Forest Plan*, pp. 87, 198-204, 234, and Appendix X). The 1990 Recovery Plan incorporated the guidelines from *Appendix X* of the *Forest Plan* with slight changes into its *Appendix A, Suggested Guidelines for Habitat Identification and Management*. Once finalized, the 1990 Recovery Plan in concert with Appendix X of the *Forest Plan* provided the primary direction for management of the WV northern flying squirrel on MNF lands.

Both the 1990 Recovery Plan and the 1986 *Forest Plan* guidelines describe "occupied" habitat as any area where the WV northern flying squirrel is known to exist through positive identification such as through trapping. The size of the occupied area was defined as all areas within ½ mile of the trapping or identification site (regardless of the habitat characteristics of the surrounding area). Because this area is based solely on the proximity to a capture site for WV northern flying squirrels, this ½ mile radius may incorporate and protect habitat that is both "suitable" and "unsuitable" (e.g. areas that would not support WV northern flying squirrels because few or none of the habitat elements required by the species were present) (USFWS, 2001). The 1990 Recovery Plan and *Forest Plan* guidelines further defined "potentially occupied habitat" for the WV northern flying squirrel as: 1) all stands containing spruce or fir, or 2) all stands above 3300 feet containing hemlock or northern hardwoods in any combination, and 3) stands with at least some 10-inch diameter at breast height or larger trees present and at least partial canopy closure (e.g., in mixed conifer/hardwood stands with a minimum basal area of 100 square feet per acre).

To ensure protection of WV northern flying squirrels, the MNF has either avoided implementing activities in potentially occupied habitat or identified occupied habitat by conducting surveys for WV northern flying squirrels within potentially occupied habitat (*Forest Plan*, Appendix X). Based on definitions identified in Appendix X, potentially occupied habitat is estimated to be in excess of 100,000 acres. To date, only a part of the potentially occupied habitat on the MNF has been surveyed for WV northern flying squirrels. From these surveys, ~72,000 acres have been identified as “occupied” habitat: ~13,000 acres in Wilderness (MP 5.0) and semi-primitive, non-motorized recreation areas (MP 6.2); and ~59,000 in Zoological Areas.

The MNF contains greater than 90% of the known habitat within WV northern flying squirrel range. A small amount of habitat (one to two percent) is located in VA on Allegheny Mountain, which is adjacent to the MNF on the George Washington/Jefferson National Forest. This area, known as the Laurel Fork Area, is considered a semi-wilderness/backcountry area.

Northern flying squirrels have been captured in stands of various ages, understories, densities, and species composition, but most have been in moist forests with some widely-spaced, mature trees, abundant standing and downed snags (USFWS, 1990; WVDNR, 1997), usually with some conifer (spruce, hemlock, fir) present (Stihler, 1994b). These habitats seem well suited to WV northern flying squirrel gliding locomotion, cavity nest requirements, and reliance on wood-borne fungi and lichens for food (USFWS, 1990). In the southern Appalachians, WV northern flying squirrel commonly are captured in and apparently prefer conifer/hardwood ecotones or mosaics dominated by red spruce and fir with hemlock, beech, yellow birch, sugar maple or red maple, and black cherry associates. At one time understory components were not thought to be significant indicators of general northern flying squirrel habitat (USFWS, 1990; Payne et al., 1989). However recent data indicates that WV northern flying squirrel have been captured in northern hardwoods with conifer in the understory (Stihler, 1995), indicating understory composition may play a greater role as a habitat indicator for this subspecies than previously thought.

As of 2001, over 1,000 WV northern flying squirrels have been captured, including a small number of recaptures, in WV in the same general six-county area. In addition, ten specimens of the WV northern flying squirrel have been captured on the Allegheny Mountain just over the WV state line in Highland County, VA, primarily on the George Washington/Jefferson National Forest (USFWS, 2001); 97% of these captures have occurred on MNF lands. The minimum elevation at which the WV northern flying squirrel was known to occur, originally set at 3,300 feet above mean sea level (MSL), has changed. The WV northern flying squirrel is now known to occupy mixed northern hardwood/hemlock stands at approximately 2,640 feet MSL. Elevation is only one indicator - local climate, soil, and aspect are also strong influences on the presence and maintenance of the preferred habitat (USFWS, 2001). Capture areas with no overstory red spruce had overstory eastern hemlock or balsam fir, with red spruce usually present nearby (Stihler et. al., 1995; Odom et al., 2001).

It is very likely WV northern flying squirrels occupy additional habitat on the MNF beyond what is currently identified as “occupied.” Under the No Action if all potentially suitable habitat as defined in Appendix X or in the 1990 Appalachian Northern Flying Squirrels’ Recovery Plan were surveyed, substantially more acres (>100,000 acres in addition to the current ~72,000 acres) may be confirmed to be “occupied” (and, therefore, protected). This would result in some cases in classifying a considerable number of acres as protected based solely on proximity to a capture site, even when few or none of the habitat elements required by WV northern flying squirrel are present.

In their November 2001 correspondence, the USFWS concurred with MNF personnel’s findings that continued implementation of the *Forest Plan* resulted in either a No Effect or May Effect, but was Not Likely to Adversely Effect WV northern flying squirrels. USFWS’s concurrence was contingent on the MNF working collaboratively with them to (1) produce a map of suitable habitat for WV northern flying

squirrels prior to implementing any site-specific activities that could adversely affect suitable habitat, and (2) reviewing the map periodically and refining it collaboratively with the USFWS and the WVDNR. This determination lead the Forest to propose deleting interim standards in Appendix X, and also changing WV northern flying squirrel Zoological Area OA 832 standards to make them more consistent with the *Appalachian Northern Flying Squirrels' Recovery Plan (Updated)*.

Shale Barren Rock Cress - This biennial herb is found mostly on shale barrens of eastern counties of WV (USFWS 1991). Mid-Appalachian shale barrens generally are characterized by open (<10% canopy closure), scrubby pine (*Pinus* spp.), oak (*Quercus* spp.), red cedar (*Juniperus virginiana*), and woody species growing on dry, south-facing steeply-sloping (>20%) shale formations. Open herbaceous cover adapted to this harsh environment also can occur (USFWS, 1991). Often the slope is undercut by a stream directly below the shale barren. In the mid-Appalachians, the shale formations are generally upper Devonian-age, though some are Ordovician- and Silurian-age (USFWS, 1991). Shale barrens are south- to southwest-facing, narrowly endemic sites on shale ridge balds. They exist on Devonian-age shales of the Brallier formation between 1300-2500 ft (396-762 m) elevations (Keener, 1983).

Nine shale barren rock cress sites are known on the MNF: Lower White's Draft (2 small barrens), Meadow Creek, Middle Mountain, Turkey Pen, Whitman Draft, Rohrbaugh Run, Blue Bend, and Humphrey's Draft (USFWS, 1988). Approximately 1,000 acres of timber sale areas have been surveyed for shale barrens using site-specific geology and aerial photos. No shale barren rock cress has been found since the 1989 endangered listing. Potential and known habitat within the entire MNF (including project acres) is estimated to be less than 100 acres. No designated critical habitat for shale barren rock cress exists on the MNF.

Virginia Spiraea – This clonal shrub occurs along stream banks, usually at water's edge, of high-gradient second- and third-order stream reaches, or on meander scrolls, point bars, natural levees, and other lower-reach braid features near the stream mouth (USFWS, 1991(b)). It requires full sun or shade (WVNHP, 1991). The single MNF VA spiraea site exemplifies ideal VA spiraea disturbance-adapted shrub habitat (USFWS, 1991(b)). VA spiraea is restricted to riparian topography where tree competition is inhibited by scouring. VA spiraea generally is associated with riparian vegetation including, but not restricted to eastern hemlock (*Tsuga canadensis*), sedges (*Carex* spp.), Rhododendron (*Rhododendron maximum*), and Carolina tassel-rue (*Trautvetteria caroliniensis*), in third-order streams at elevations above 2600 ft (790 m) where it is not overtopped by arboreal or fast growing herbaceous species. Since its 1991 listing, the MNF has done VA spiraea surveys on approximately 60 miles of streams within 70,000 acres of project areas containing potential habitat. No new VA spiraea sites have been found on the MNF. Approximately 100-150 stream miles of potential VA spiraea habitat exist within potential project areas. No designated critical VA spiraea habitat exists on the MNF.

Running buffalo clover - Existing running buffalo clover populations occur in floodplain forests, field edges (Bartgis, 1985), old skid roads and ungravelled truck roads, cemeteries, open woodlands, mowed parks, jeep trails, and hawthorn thickets (Cusick, 1989). It prefers semi-shaded woods and depends upon slight levels of disturbance for survival. Natural populations do not occur in areas of full sun (Ostlie, 1990). Evidence indicates running buffalo clover responds favorably to low levels of disturbance that occur during road construction, use, and abandonment (USFWS, 1998); terrace farming; and 4-wheel vehicle disturbance (Concannon, 1997 pers. obs.). Soil disturbance resulting from construction and use of a skidder trail and silvicultural treatments opening forest canopies so the road is exposed to sunlight are factors believed to be responsible for creating additional habitat for this species (Tolin pers. comm. 1998).

Running buffalo clover has a high affinity for calcium-rich soil, restricted to Greenbrier Limestone or areas downslope from this formation that receive nutrient run-off. Prior to its listing, running buffalo clover was known at only two WV sites. Approximately 120,000 project acres have been analyzed and/or

surveyed for running buffalo clover in the past ten years. Through those surveys, running buffalo clover populations have been found on the Cheat/Potomac and Greenbrier Districts. Today, running buffalo clover is known on 11 MNF sites, with approximately 107,000 individuals. These populations contribute significantly to the viability of this species. No designated critical habitat exists on the MNF for running buffalo clover (USFWS 1989).

Small-whorled pogonia – This species is found in mixed deciduous or mixed-deciduous/coniferous forest in second growth and mature forests on highly acidic fragipan soils with lateral water drainage. Herbaceous cover ranges from none to dense. Common associates include witch hazel, Indian cucumber root, white pine, oaks, and hemlock. Occurs in dense shade, as well as near forest edges

In fall 1997, small-whorled pogonia was found on one site in the Land Type Association (LTA) Bd03 on the Marlinton/White Sulphur Ranger District. Associates are part of the indicator suite for a white pine ecological association, which occurs in southern and drier parts of the MNF. The area is traversed by 80+ year-old logging roads. While the local flora is described as dry woodland type, the relative humidity is higher than the surrounding landscape due to lateral water drainage from upslope. These local microclimatic conditions control small-whorled pogonia habitability.

Approximately 5,000 acres of the white pine, low elevation ecological landtypes of LTA Bd03 (DeMeo, 1998) in the MNF have been surveyed for small-whorled pogonia. In addition, all proposed projects across the MNF have been surveyed. No new sites have been found. No designated critical small-whorled pogonia habitat exists on the MNF.

Note: USFWS has recently received a petition to consider the listing of the cerulean warbler. This warbler is listed as a sensitive species on some Forests within Region 9. However, this species is considered locally common on the MNF. A risk assessment was completed for this species and is available in the MNF Supervisors Office. This risk assessment concluded that there was no need to include the cerulean warbler as a R9 Sensitive Species on the MNF. Consequently, effects to this species will not be analyzed in this report.

METHODOLOGY

This section addresses the extent to which proposed standards would affect threatened and endangered species of the MNF and the Forest's ability to manage these species. The analysis is based on the potential for the alternatives to affect populations, individuals, and/or habitat conditions in areas occupied by threatened and endangered species beyond those effects already considered in the existing *Forest Plan*. Generally, proposed changes are based upon information on threatened and endangered species ecological requirements that have been acquired through consultation with USFWS and as documented in current scientific research. Consequently, the assumption is made that proposed changes for a given threatened and endangered species would generally benefit that species unless otherwise stated. However, changes generated for one species may affect other threatened and endangered species found on the MNF. Each alternative will be analyzed to determine the extent this may occur.

Known distributions of threatened and endangered wildlife and plant populations are established using data sets from the MNF, WVDNR, and WV Natural Heritage Program (WVNHP).

"Determinations of effect" are based on definitions found in the 1986 Endangered Species Act regulations (50 CFR Part 402) and the USFWS Endangered Species Consultation Handbook (USFWS 1998). An analysis of alternatives that are expected to have no effect on a particular threatened and endangered species results in a determination of "**No Effect**" for that species. This situation is most likely when threatened and endangered species do not occur in any area that would be affected by the proposed changes in a given alternative or if the activities proposed would be completely benign to the species or its habitat. However, if changes proposed by an alternative would apply to areas that are occupied by a

particular threatened and endangered species and there may be effects (either positive or negative) to that species a “**May Affect**” determination is made. Where effects to a particular species are expected to be insignificant (immeasurable), discountable (extremely unlikely), or completely beneficial a “**May Affect, Not Likely To Adversely Affect**” determination is made. Effects analysis results in a determination of “May Affect, Likely to Adversely Affect” where effects are expected to be adverse.

It is possible that an alternative would result in no impact to one or more threatened and endangered species, while detrimentally impacting others and/or beneficially impacting others. It is also possible that some aspects of an alternative would be associated with beneficial effects to a threatened and endangered species while other aspects of the alternative would be considered adverse for the same species.

Effects to individual threatened or endangered species from the Proposed Threatened and Endangered Species Amendment to the *Forest Plan* are considered at the programmatic level. Effects are described in qualitative terms. The effects that each alternative would have on threatened and endangered species are addressed by evaluating habitat at the landscape scale. Effects described in the silvicultural, timber and other sections of the EA were reviewed to determine how each alternative may result in habitat changes that may indirectly affect threatened and endangered species. Also, considered were potential effects to those physical or biological features required by threatened and endangered species found at the microhabitat scale (habitat elements such as snags/clumps, dens, roost trees, reproductive or rearing sites, bogs, etc.).

Not all proposed standards or are addressed. Some changes are only editorial and/or have no effect to threatened and endangered species. Only those standards with potential for effects are discussed in this section. Additional information regarding effects on threatened and endangered species may be found in the Biological Evaluation (Appendix G).

Many factors (e.g. diseases, parasites, weather conditions, acid deposition, etc.) that have the potential to limit populations of threatened, endangered, and sensitive species are largely beyond Forest Service control or jurisdiction and are not addressed here.

DIRECT & INDIRECT EFFECTS

No Action

This alternative would implement the existing *Forest Plan*, as amended to date, and it is the direction currently guiding management of the MNF. The direct, indirect, and cumulative effects of implementation of the *Forest Plan* and determinations are described in the *Revised Biological Assessment* and would apply to this alternative.

As a outcome of the *Revised Biological Assessment* The Forest determined that continued implementation of the *Forest Plan* would result in findings of “No Effect” and/or “May Effect – Not Likely to Adversely Effect” for the bald eagle, Cheat Mountain salamander, VA big-eared bat, WV northern flying squirrel, running buffalo clover, shale barren rock cress, small-whorled pogonia, and VA spiraea (USFS, *September 2001 Revised Biological Assessment*, pp. 2-4; USFWS correspondence, 11/09/2001). The Forest also determined that all activities that involve tree cutting or prescribed fire would result in a “May Effect, Likely to Adversely Effect” for the Indiana bat.

Effects Related to Indiana bat

Terms and Conditions as defined in the *Biological Opinion* would not be incorporated into the *Forest Plan*. Because the *Terms and Conditions* would not be incorporated into the *Forest Plan*, this alternative would be a violation of the ESA and the NFMA.

The chances of directly harming an individual Indiana bat during MNF tree cutting activities or prescribed fire in the general forest area is relatively small, but it is not discountable. It is not

discountable for the following reasons: 1) there may potentially be roosting bats and/or maternity colonies in upland areas; 2) the ability of this mobile species to move into “cleared” project areas; and 3) the lack of sufficient knowledge of this species. However, the risk of harming Indiana bats by removing an occupied roost tree or a maternity roost tree is relatively small considering: 1) the limited amount of the MNF affected annually by tree removal; 2) some of this removal occurs by means of helicopter logging during the bat hibernation (when Indiana bats are not roosting in trees); and 3) the vast numbers of suitable roost trees (both living and dead) available for the relatively small number of Indiana bats that inhabit the MNF during the summer and fall months. The possibility of take exists; but the *Biological Opinion* concluded that implementation of the *Forest Plan* was not likely to jeopardize the continued existence of the Indiana bat.

Overall, indirect effects to Indiana bat habitat in both the overall forest area and the five-mile radii surrounding known hibernacula from MNF activities are more positive than negative. Most MNF acreage provides potential roosting habitat and many existing MNF standards improve or supply additional roosting and foraging habitat (e.g. standards for leaving snags, wetland and seep protections, corridor protections). During commercial timber harvests and other activities in which trees are felled, potential roost trees are removed. However, the effects are extremely minor compared to the large number of roost tree numbers available on the MNF.

Although the removal of trees can result in a negative impact at times, it may also provide more suitable roost trees through exposing new and existing snags to additional solar exposure (USFWS 1999).

Effects Related to WV northern flying squirrel

The general effects and determinations as described in the *Revised Biological Assessment* would apply. However, in their November 2001 correspondence, the USFWS concurred with MNF personnel’s findings that continued implementation of the *Forest Plan* would result in a No Effect or a May Effect, but was Not Likely to Adversely Effect WV northern flying squirrels. USFWS’s concurrence was contingent on the MNF changing WV northern flying squirrel Zoological Area OA 832 standards to make them more consistent with the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)*. The No Action alternative would be inconsistent with the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)* and with USFWS concurrence.

Under the No Action, the burden of proof is placed on live trapping and/or the placement and monitoring of nest boxes to determine if potential habitat is occupied. The USFWS, WVDNR, MNF, and the Recovery Team agree, based on the data gathered over the past ten years, that this approach may not have protected WV northern flying squirrel habitat to the fullest extent possible. WV northern flying squirrels are less likely to use nest boxes or enter traps in good quality habitat due to the natural presence of numerous den sites and an abundance of preferred foods. The indication that the WV northern flying squirrel has a strong preference for natural versus artificial habitat elements could theoretically result in some degree of under-representation of occupied habitat when using these methods of sampling, although this cannot be empirically demonstrated (USFWS, 2001). As a result, under this alternative less protection would be afforded the better quality habitat.

Effects Related to Virginia big-eared bat

No changes would occur. The general effects and determinations as described in the *Revised Biological Assessment* would apply.

Effects Related to Editorial/Administrative Changes Or Clarifications

No changes would occur. For example, the *Forest Plan* would not list all known threatened and endangered species on the MNF. Updates to the federally listed and proposed, threatened and

endangered list that identify new species for the MNF would automatically trigger the protections inherent in the *Forest Plan* and FS policy. These protections could continue to be implemented under the general language and direction of the existing *Forest Plan* (e.g. “Management will protect or enhance habitat for threatened and endangered species”) but would not be as straightforwardly stated.

The general effects and determinations as described in the *Revised Biological Assessment* would apply.

Proposed Action

The Proposed Action would add, modify, and/or delete some Forest-wide, Management Prescription, and Zoological Area standards of the 1986 *Forest Plan*, as amended to date. Various standards would be integrated into the *Forest Plan* that would address pertinent new scientific information about threatened and endangered species. The most noticeable changes that the Proposed Action would make would be in the management of Indiana bat and WV northern flying squirrel habitat. The Proposed Action would formally integrate the “*Terms and Conditions*” of the of the USFWS’s *Biological Opinion* for the Indiana bat and the *Guidelines for Habitat Identification and Management for Glaucomys sabrinus fuscus* from the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)* into *Forest Plan* direction. The Proposed Action would create MP 6.3 and associated standards (e.g. seasonal restrictions) that would provide for protection of swarming areas (five-mile radii around hibernacula) around known Indiana bat hibernacula.

Effects Related to Proposed Changes for Indiana bat

This alternative would incorporate into the *Forest Plan* the USFWS issued *Terms and Conditions* for the Indiana bat found in the *Biological Opinion*. *Terms and Conditions* are designed to further minimize the likelihood of incidental take (death or harm) of Indiana bats during implementation of the MNF’s *Forest Plan*. This alternative would not incorporate the Conservation Recommendations of the *Biological Opinion*. The Proposed Action also would include seasonal restrictions on tree felling for large-scale activities.

During formal consultation, USFWS identified *Reasonable and Prudent Measures*, and *Terms and Conditions* to minimize the take of Indiana bats and documented these conditions in the *Biological Opinion*. The integration of these terms and conditions into the *Forest Plan* through the amendment process, would 1) minimize the level of the incidental take due to tree felling identified for the Indiana bat on both a programmatic and site-specific scale; and 2) minimize the potential effect of prescribed fire and smoke on occupied Indiana bat hibernacula or roosting bats.

At a Forest level, however, incorporating these *Terms and Conditions* is unlikely to remove every chance for incidental take. To further reduce the likelihood of incidental take of Indiana bats during implementation of the MNF’s *Forest Plan*, the Proposed Action includes seasonal restrictions on tree felling for large-scale activities (e.g. most timber sales, construction of collector and arterial roads, etc.) via establishment of MP6.3. These activities would be prohibited within the primary range (MP6.3) of the Indiana bat between April 1 and November 15, during which time Indiana bats would most likely be in hibernacula. Restricting tree felling for large-scale activities to periods when the bat is hibernating, in theory, would have the effect of further reducing potential for incidental take of Indiana bats through the reduction in number of potentially occupied roost sites that would be disturbed. The direct effect of this seasonal restriction would be that the chance of incidental take of Indiana bat would be discountable within the area of influence for Indiana bat.

The *Revised Biological Assessment* determined that the continued implementation of the *Forest Plan* would result in A May Affect, Not Likely To Adversely Affect to bald eagle, Cheat Mountain salamander, VA big-eared bat, WV northern flying squirrel. Incorporation of *Terms and Conditions* would have very minimal effect on these species. Seasonal restrictions would further diminish the

risk to these species, as these species are generally inactive or less active during the winter when harvest would occur, over-wintering habitat (e.g. caves) may occur where the threat from tree felling is removed; or species may not be present on the MNF during winter. Although it is difficult to determine the degree of benefit achieved through this further reduction, it is believed to be minimal given the scale and design of timber harvests and other tree felling activities.

The Proposed Action would protect Indiana bat hibernacula and lands within 200 feet, key areas (at least 150 acres of mature or old growth stands near hibernacula), maternity roosts (two-mile buffer), and the primary range (swarming areas/land within five-mile radii of Indiana bat hibernacula).

Indirectly, provisions that would result in mature and older aged stands, longer rotations, and their associated elements (snags, dead and down woody debris, small openings, more open canopies, greater diversity in the understory) would generally result in favorable habitat elements for Indiana bat, Cheat Mountain salamander, WV northern flying squirrel and possibly small-whorled pogonia.

The Proposed Action would retain all shagbark hickory trees in cutting units except where public safety concerns exist. Retention of shagbark hickory trees would provide additional roosting habitat to Indiana bat and to a small degree VA big-eared bat. Other threatened and endangered species are likely to incur minimal or no effects as a result of this proposed change.

There may also be direct and indirect benefits to Indiana bat and other threatened and endangered species that require snags or cavities as a result of the protection or creation of snags, prioritization of snags by size class (16 inches dbh or greater preferred), protection of roost trees, larger diameter trees, longer rotations, and old growth requirements of this alternative. For example, bald eagle may benefit from super canopy trees and from standing snags while species such as the Cheat Mountain salamander would indirectly benefit from dead and downed logs after snags fall. A review of existing Indiana bat literature (Menzel et. al., 2001) indicates that Indiana bats show a clear preference for these habitat elements.

Creating and protecting areas of influence for Indiana bat could conceivably create conflicts with other conservation efforts for threatened and endangered species that require disturbance, such as running buffalo clover, that occur within these areas of influence (e.g. protections may limit disturbance levels within the area of influence). Disturbance could be needed, for example, in terms of reducing shade for shade intolerant species, introducing fire for habitat maintenance, or eliminating invasive exotic tree species. The probability of the coincidence of a known threatened and endangered species' occurrence within the protected area around a maternity roost tree is so low at this time (given the current lack of known roost trees on the Forest) as to make the risk nearly discountable. Overlap between Indiana bat primary range (MP6.3) and other threatened and endangered species' areas of influence, especially WV northern flying squirrel (Zoological Area 832) is more likely. Approximately 35,000 acres of MP6.3 overlap WV northern flying squirrel suitable habitat. Management objectives for Indiana bat and WV northern flying squirrel, as well as other threatened and endangered species found on the MNF, are not expected to be incompatible. In any case, such conflicts could be resolved in ways that attempt to maintain both Indiana bat and other threatened and endangered species at issue. In those rare cases where they are incompatible, conflicts would be resolved through consultation with USFWS. Generally, any irreconcilable conflicts between Indiana bat standards as proposed and other threatened and endangered management goals are not anticipated.

Standards under the Proposed Action (Appendix A, p.8) that would require any new Indiana bat hibernacula discovered to have an appropriate protection plan (which could include signs, fences, or gates) would provide beneficial effects to Indiana bat. These same standards would also benefit VA big-eared bat if the newly discovered cave were also occupied by this species.

Compared to the No Action, standards under this alternative (Appendix A, pp. 14-23) that favor group selection, shelterwood, and two-aged regeneration harvest in Indiana bat primary range (MP6.3) generally would provide better foraging and roosting habitat for Indiana bat (MacGregor, 1997). Retaining additional residuals, larger trees, and greater basal areas within cutting units should contribute additional habitat elements for the future in support of some threatened and endangered species (e.g. Cheat Mountain salamander, Indiana bat, bald eagle) that require more humid microclimates, snags, or dead and down logs. Residual trees receiving increased solar radiation become more desirable as Indiana bat roost trees and potential maternity roosts, and the regenerating forest provides additional varieties and numbers of insect prey for all eastern woodland bat species. Plant species such as running buffalo clover, which require moderate openings in the canopy would also benefit from this emphasis.

Although clearcutting would not be the preferred silvicultural practice, it would be allowed in MP 6.3 in some cases. Indiana bats have been shown to occupy highly altered landscapes in many areas in the eastern United States. Anecdotal evidence suggests that the Indiana bat may, in fact, respond positively to some degree of habitat disturbance (USFWS, 2002). Callahan et al. (1997) even suggested that management practices, such as even-aged and uneven-aged management, could be used if they include provisions for snag retention and if oaks and shagbark hickories are favored. Research suggests that Indiana bats may benefit from limited disturbance around potential roosting areas. Limited disturbance can create potential roost trees (Gardner et al., 1991) and open the canopy around potential roost trees (Gardner et al., 1991; Kurta et al., 1993). In any case, disturbances from timber practices or from other factors that change behavior of Indiana bats but do not change overall habitat fitness should not be considered negative (Menzel et al., 2001). Regardless of the method, timber harvest that is allowed under this alternative would be consistent with the level that was analyzed in the *Revised Biological Assessment*. Consequently, the effects for all threatened and endangered species are the same as described in the *Revised Biological Assessment* and in the No Action Alternative.

Effects Related To Proposed Changes for WV Northern Flying Squirrel

Under the Proposed Action the net increase of acres receiving additional, immediate protection via standards for WV northern flying squirrel under this alternative would be approximately 49,500*. However, given additional time and surveys this acreage (and more) may eventually be demonstrated to be “occupied” under the No Action Alternative, thus ultimately receiving the same protections and conveying the same or greater effects on other resources. This immediate, straight away approach under the Proposed Action would result in beneficial effects to the squirrel; less uncertainty and greater efficiency in planning and implementing activities; and cost savings (both surveys and planning dollars).

By and large, the same restrictions that apply to “occupied” habitat under the No Action Alternative based on general direction in the *Forest Plan* are applied to “suitable” habitat under the Proposed Action. The effect of implementing this alternative would be to distribute these restrictions spatially

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- * Acres do not include MP 5.0 and 6.2 areas as these provide sufficient protections to the WV northern flying squirrel currently. Changes between acres occur in different areas - non-suitable habitat within ½ circles would be removed from protections that exist under the No Action Alternative while other areas more likely to give refuge to WV northern flying squirrel would be added. For example, about 58,000 acres of MP 6.1 would be managed as suitable habitat for WV northern flying squirrel (added to Zoological Area 832), and elsewhere about 15,000 acres would be removed from OA 832 and returned to MP 6.1 management. This 15,000 acres does not come from the 58,000 acres, however the net effect overall is for about 43,000 acres to change from MP 6.1 to Zoological Area 832 (MP 8).

in a different manner. Restrictions would be removed on approximately 26,000 acres, remain constant on approximately 39,000 acres, and added to approximately 49,500 acres.

Removal of restrictions on the approximately 26,000 acres may effect, but would not likely adversely effect WV northern flying squirrel on the MNF as these acres provided few or none of the habitat elements required by the squirrel. If WV northern flying squirrels do in fact occupy some of these acres or use areas as corridors, those areas identified would be incorporated into the suitable map as USFWS, WVDNR, and the MNF refine the map at the watershed and project levels. As such, those areas would continue to protect WV northern flying squirrels and their habitat. Other known threatened and endangered species that occupy these areas would no longer receive protections associated with WV northern flying squirrel but would be subject to independent protections associated with the individual threatened and endangered species (e.g. buffers around Cheat Mountain salamander locations).

No effects to WV northern flying squirrel or other threatened and endangered species would result from those acres that remain constant under these restrictions. The effect of redistribution would provide protection to more appropriate, high quality areas fitting the WV northern flying squirrel's exhibited habitat preferences on approximately 49,500 acres. These additions to Zoological Area 832 would provide further protections for clearly identified WV northern flying squirrel habitat promoting recovery of this endangered species. Effects of these subtraction or addition of acres and/or redistributions on other threatened and endangered species found on the MNF would be considered minimal.

Overlap with other threatened and endangered species' areas of influence would occur. Approximately 35,000 acres of Indiana bat primary range (MP6.3) overlap WV northern flying squirrel suitable habitat. As discussed above, most conflicts could be resolved in ways that attempt to maintain both Indiana bat and any other threatened and endangered species at issue through consultation with USFWS. Irreconcilable conflicts between WV northern flying squirrel guidelines as proposed and other threatened and endangered species' management goals are not anticipated.

Effects Related To Proposed Changes for Virginia Big-Eared Bat

Standards proposed under this alternative (Appendix A, pp.6, 25-30) are fairly consistent with those in the current *Forest Plan* (No Action). The area of influence for VA big-eared bat would be designated as MP 8.0, Zoological Opportunity Area 837.

Proposed changes include:

- Before taking any actions on buildings that are within six miles of VA big-eared bat hibernacula or maternity sites, evaluate their potential to serve as roosting habitat and apply management protections as necessary.
- Burn plans for prescribed fires will be developed to ensure adverse effects to Virginia big-eared bats are avoided.

The *Revised Biological Assessment* determined that continued implementation of the *Forest Plan*, including protections for VA big-eared bat, would result in no adverse effects to threatened and endangered species, with the exception of the Indiana bat, found on the MNF. Identified adverse effects to the Indiana bat were not related to implementing VA big-eared bat protections. Implementation of changes proposed for VA big-eared bat would not change the effects to nor the determination for these species as discussed in the *Revised Biological Assessment* with the following exception. Standards added give clarity to normal procedural actions, which would result in a slight beneficial effect to VA big-eared bat.

Effects Related To Proposed Editorial/Administrative Changes or Clarifications

Under this alternative, all threatened and endangered species found on the MNF would be identified in the *Forest Plan* and additional resource protection and monitoring objectives for threatened and endangered species added. Changes would have no negative impact to current threatened and endangered species. Designations of federally listed and proposed species are actions undertaken by entities other than the MNF, and the MNF is therefore required by law, policy, and the *Forest Plan* to recognize these designations, as frequently as they may change. Referencing a current list held by USFWS would serve the needs of these species more effectively by helping keep up with changes in this rather dynamic area. Updates to the federally listed and proposed, threatened and endangered list that identify new species for the MNF would automatically trigger the protections inherent in the *Forest Plan* and FS policy.

Many of these protections have been implemented in the past under the general language and direction of the existing *Forest Plan* (e.g. “Management will protect or enhance habitat for threatened and endangered species”). Standards added give clarity to normal procedural actions. Also, programmatically the scale of these protections is relatively small (~ 4,500 acres) compared to the overall forest acreage and there is little overlap between areas. Consequently, formalizing these protections in the *Forest Plan* would result in minimal direct or indirect effects to threatened and endangered species. If there were an impact at all, it would be beneficial, in that MNF goals, objectives, and direction would be more clearly articulated within the *Forest Plan*, and so would heighten awareness and understanding of the threatened and endangered species’ program and the Forest’s responsibility regarding viability of rare species.

Editorial and/or administrative changes such as reporting requirements would not affect threatened and endangered species.

Alternative 1

Effects Related To Proposed Changes For Indiana Bat

For this alternative direct and indirect effects associated with these changes differ from the No Action Alternative in the same manner as described for the Proposed Action with the following exceptions:

The Proposed Action included standards with seasonal restrictions intended to further reduce the chance of “taking” a roosting Indiana bat beyond what USFWS identified in the *Biological Opinion*.

Alternative 1 does not include these seasonal restrictions. The direct effect of not applying seasonal restrictions in key areas and primary ranges of the Indiana bat would be that the risks for incidental take would be greater than under the Proposed Action but less than the No Action. However, the level of incidental take incurred under this alternative would still fall within that permitted under the Incidental Take Permit issued by the USFWS.

This alternative would incorporate the *Terms and Conditions* in the same manner that the Proposed Action would, thus effects of these changes would differ from the No Action Alternative in the same manner as described for the Proposed Action.

Alternative 1 also differs from the Proposed Action in that it would include standards incorporating USFWS recommended *Conservation Measures*. Incorporating these *Conservation Measures* into the *Forest Plan* would expand and add emphasis and focus to the MNF’s existing conservation education efforts. These conservation efforts - which are designed to reduce potential for incidental take, improve habitat conditions, enhance our knowledge, and broaden citizenry awareness - assist in recovery of threatened and endangered species and wildlife conservation as a whole. As such, incorporating *Conservation Measures* would result in beneficial effects to Indiana bat and many other threatened and endangered and RFSS species.

Retaining or creating small pools of water would provide additional sources of drinking water for forest bats (including the Eastern small-footed bat), other RFSS, and many additional wildlife species.

No negative effects are anticipated to other threatened and endangered species from the implementation of these Conservation Measures.

Effects Related To Proposed Changes For WV Northern Flying Squirrel, Virginia Big-Eared Bat, and Proposed Editorial/Administrative Changes Or Clarifications

For this alternative, direct and indirect effects associated with these changes would differ from the No Action Alternative in the same manner as described for the Proposed Action.

Alternative 2

Alternative 2 was developed to provide maximum roost tree protection and reduce potential for incidental “taking” of an Indiana bat more than any other alternative.

Effects Related To Proposed Changes For Indiana Bat

Alternative 2 like the Proposed Action:

- Would incorporate and/or exceed the USFWS-issued *Terms and Conditions* for the Indiana bat found in the *Biological Opinion* into the *Forest Plan*, and
- The area of influence for Indiana bats would be divided into distinct, biologically based areas—hibernacula and lands within 200 feet, key areas (at least 150 acres of mature or old growth stands near hibernacula), maternity colonies and lands within a two-mile radius, and the primary range (land within five-mile radii of Indiana bat hibernacula), and
- Hibernacula, key areas, and land within two miles of maternity colonies of Indiana bats would be managed under Forest-wide and Zoological Area standards (MP 8.0, Zoological Area designated as OA 838) with specific restrictions and management objectives geared to the protection and recovery of Indiana bats.

Consequently, for these actions, direct and indirect effects would differ from the No Action Alternative in the same manner as described for the Proposed Action.

However, under Alternative 2 the primary range of the Indiana bat would be managed under Forest-wide and Zoological Area standards (MP 8.0, Zoological Area OA 838) with specific restrictions and management objectives geared to the protection and recovery of Indiana bats. MP 6.3 and associated standards would not be created (Appendix A, pp. 13-22).

This alternative would prohibit commercial timber harvests within key areas, within two-mile radii of maternity colonies, and within the primary range of the Indiana bat (Appendix A, p. 32). Non-commercial methods of vegetation management would be used to create a variety of tree species, sizes, and age classes for Indiana bats and other wildlife (Appendix A, p.31). While this alternative would work towards Indiana bat recovery through integration of the *Terms and Conditions* conservation program, it is nearly equivalent to the Proposed Action in reducing the potential for incidental take.

During formal consultation, the USFWS identified reasonable and prudent measures, and terms and conditions to minimize the take of Indiana bats and documented these conditions in the *Biological Opinion*. Prohibiting commercial timber harvests within key areas, within two-mile radii of maternity colonies, and within the primary range of the Indiana bat, in theory, would have the effect of further reducing the potential for incidental take of Indiana bats – through the reduction in number of potentially occupied roost sites that are disturbed – from that described in the No Action. Although it is difficult to determine the degree of benefit achieved through this further reduction, it is believed to be nearly equivalent to that described in the Proposed Action. The direct effect of this restriction would be

that within the area of influence there would be no chance incidental take as a result of commercial timber harvests. The chance of taking an Indiana bat inside the area of influence as a result of tree felling for small-scale activities, or outside of these areas through all activities, would be discountable.

Under this alternative, management of vegetation 5" dbh or greater could be implemented within the primary range of Indiana bats, but only to improve or enhance Indiana bat habitat, to maintain or enhance natural vegetative communities on appropriate sites (see Forest-wide standards and guidelines 1900 – Vegetation), or for public safety. Also, see proposed Zoological Area OA 838 standards for 2400 (Timber Management) and 2670 (Threatened and Endangered Species that are related to vegetation management. Non-commercial methods of vegetation management would be used to create a variety of tree species, sizes, and age classes for Indiana bats and other wildlife (Appendix A, p.31) – normally girdling trees without tree felling. The indirect effect of this would be improved habitat conditions for Indiana bat. Due to potential economic constraints the total number of acres improved may be less than other alternatives.

Alternative 2 is similar to Alternative 1 in that it 1) would incorporate the “Conservation Recommendations” identified in the USFWS’s *Biological Opinion*, and 2) it would not impose a seasonal limitation on large-scale tree felling activities (Appendix A, p. 32) within key areas and the primary range. Consequently, for these actions, direct and indirect effects would differ from the No Action in the same manner as described in Alternative 1.

Effects Related To Proposed Changes For WV Northern Flying Squirrel, Virginia Big-Eared Bat, and Proposed Editorial/Administrative Changes Or Clarifications

For this alternative, direct and indirect effects associated with these changes would differ from the No Action Alternative in the same manner as described for the Proposed Action.

CUMULATIVE EFFECTS

None of the alternatives would result in adverse cumulative impacts to proposed, threatened, and endangered species or prevent achievement of the Forest goals for threatened, endangered, and proposed species management.

Habitats on the MNF support numerous threatened, endangered, and proposed species--from those species that only utilize open lands, riparian habitat, caves, certain vegetation types, and certain forest structures to those that use two or more of these habitat types. Implementation of the *Forest Plan* since 1986 has continued to provide a mix of habitat types being dispersed across the MNF. The private lands in or near the Proclamation Boundary are also providing available habitat. Regardless of the alternative selected, threatened, endangered, and proposed species’ habitat on MNF and private lands would continue to be affected by natural succession, land management practices, weather conditions, insects, diseases, wind and ice storms, etc. Such past, present, and reasonably foreseeable future actions have, and will continue to affect the spatial distribution of certain types and availability (location and density) of habitat components necessary for persistence of threatened, endangered, and proposed species (e.g. microclimate condition, cover and nutrient sources, etc). However, none of the alternatives would substantially change the relative amounts or availability of these habitat types and components across the Forest.

DETERMINATIONS

Based on the analysis and determinations made by the MNF in the programmatic *Revised Biological Assessment*, concurrences made by the USFWS in the *Biological Opinion*, and the analysis of effects contained within the Biological Evaluation, no change in determinations are required for Eastern cougar, Gray wolf, bald eagle, Cheat Mountain salamander, Indiana bat, VA big-eared bat, WV northern flying squirrel, shale barren rock cress, VA spiraea, running buffalo clover, and the Small-whorled pogonia for any of the alternatives. The changes proposed to the *Forest Plan* are consistent with those actions

recommended by the USFWS in the *Biological Opinion* for Indiana bat and the updated *Guidelines for Habitat Identification and Management for Glaucomys sabrinus fuscus*, and do not appreciably change the effects described in the *Revised Biological Assessment* to threatened and endangered species other than the Indiana bat and WV northern flying squirrel.

The No Action Alternative would be inconsistent with the *Terms and Conditions* in the *Biological Opinion* for Indiana bat and inconsistent with the updated recovery plan for WV northern flying squirrel.

The following determinations of effects to Threatened and Endangered species have been made as a result of the Biological Evaluation in Appendix G. These determinations apply to all alternatives.

Bald eagle

May Affect, Not Likely To Adversely Affect.

Cheat Mountain salamander

May Affect, Not Likely To Adversely Affect.

VA big-eared bat

May Affect, Not Likely To Adversely Affect. This determination is made for both the VA big-eared bat and its designated critical habitat.

WV northern flying squirrel

May Affect, Not Likely To Adversely Affect

Running buffalo clover

May Affect, Not Likely To Adversely Affect

Shale barren rock cress

May Affect, Not Likely To Adversely Affect

Small-whorled pogonia

May Affect, Not Likely To Adversely Affect.

VA spiraea

No Effect

Proposed Species and Habitat

No effect

Indiana bat

May Affect, Likely To Adversely Affect.
No effects beyond those previously disclosed and addressed in the *Revised Biological Assessment* (USFS, 2001) and *Biological Opinion* (USFWS, 2002).

All alternatives would allow some activities that could result in disturbance to threatened and endangered species or their habitats. With the exception of the Indiana bat, the amount or scale of these activities combined with the protective measures that have been, or are proposed for implementation, render these impacts discountable. The actions found in all action alternatives would further promote the conservation and recovery of threatened and endangered species on the MNF.

For the Indiana bat the determination of May Effect, Likely to Adversely Effect is made as a result of large-scale tree removal activities (e.g. timber sales, road construction, minerals, and prescribed fire) that could occur in all alternatives. Tree removal either in the areas of influence for the Indiana bat or beyond (forest-wide) during the non-hibernation period (April 1 - November 15) may directly result in mortality (take) of an individual roosting Indiana bat, if a tree containing a roosting bat is removed either intentionally or felled accidentally. Even if a bat using a roost tree that is removed were not killed during the removal, the roosting bat would be forced to find an alternative tree, potentially expending a significant amount of energy that would result in harm or harassment of the individual. This also would constitute take (USFWS, 2002).

The determination of effects of *Forest Plan* implementation on Indiana bat is documented in the *Revised Biological Assessment*, and has been reviewed by the USFWS, which issued its concurrence with the *Revised Biological Assessment's* determinations in the form of a *Biological Opinion*. All action alternatives would amend the *Forest Plan* to include the Terms and Conditions contained within the

Biological Opinion. These Terms and Conditions were identified by the USFWS as measures to minimize impacts to Indiana bat. Consequently, all action alternatives fall within the scope addressed in the USFWS *Biological Opinion* and within the level of take identified in the Incidental Take Permit. The USFWS, as documented in the *Biological Opinion*, concluded that implementation of the *Forest Plan* with the mandatory Terms and Conditions was not likely to jeopardize the continued existence of the Indiana bat (USFWS, 2002). Based on the analysis of effects contained in the Biological Evaluation in Appendix G, the MNF has determined that the proposed *Threatened and Endangered Species Amendment to the Forest Plan* and its action alternatives would have no additional effects to Indiana bat that were not previously disclosed and evaluated during the programmatic consultation on the *Forest Plan*.

All action alternatives also would amend the *Forest Plan* to include changes found in the updated recovery plan and the *Guidelines for Habitat Identification and Management for Glaucomys sabrinus fuscus*. The effects of *Forest Plan* implementation on federally listed or proposed, threatened and endangered species found on the MNF, as documented in the *Revised Biological Assessment*, were analyzed based upon implementation of the *Appalachian Northern Flying Squirrels' Recovery Plan (Updated)* – the *Forest Plan* has broad, general direction compelling the Forest to follow the requirements of Endangered Species Recovery Plans. These determinations were reviewed by the USFWS, which issued its concurrence with the *Revised Biological Assessment* determinations in the *Biological Opinion*. Consequently, incorporating proposed changes specific to the WV northern flying squirrel and the updated recovery plan into the *Forest Plan* would have no additional effects to WV northern flying squirrel or other threatened and endangered species beyond what has been determined in the *Revised Biological Assessment*.

Currently there are neither species proposed for listing on the MNF nor any proposed critical habitat. For that reason, there would be **No effect** to proposed species or habitat from the proposed Threatened and Endangered Species' Amendment to the *Forest Plan*.

The MNF has requested concurrence from USFWS on the Forest's determinations for the bald eagle, Cheat Mountain salamander, VA big-eared bat, WV northern flying squirrel, running buffalo clover, shale barren rock cress, small-whorled pogonia and VA spiraea. The Forest also has requested initiation of formal consultation on the Indiana bat (as required under ESA) under the tiering process described in the *Biological Opinion* (Term and Condition #11) for the proposed Threatened and Endangered Species Amendment to the *Forest Plan*.

SENSITIVE SPECIES

AFFECTED ENVIRONMENT

Forest Service policy (FSH 2670 and FSH 1950) encourages sensitive species be protected to prevent the loss of species viability or significant trends toward listing as Federal Threatened or Endangered Species. The following is used to guide management of Regional Forester's Sensitive Species (RFSS) on the MNF:

Forest Goals

"Manage habitat to help recovery of threatened and endangered species on the Forest. Protect sensitive and unique species until their populations are viable. Improve the diversity of plants, animals and stand conditions..." (Forest Goal IV, *Forest Plan*, p. 37).

To accomplish this goal, the *Forest Plan* identified Forest-wide standards to guide RFSS management across the MNF (*Forest Plan*, pp. 50, 84-85, and 87). Protection of MNF RFSS is primarily guided by standards 2670(A) (3) and 1-3 of 2670(B) (*Forest Plan*, p. 87). Management will protect or enhance

habitat for threatened and endangered species and consider the needs of species identified as special or unique (Forest-wide general direction, *Forest Plan*, p 84). Sensitive species may also receive protection via the implementation of other resource standards (Forest-wide, MP, and Zoological Area standards) that protect or restore --

- Seeps and bogs (*Forest Plan*, pp. 62,111, 123, 136-137, 149, and 178).
- Soils, streams, and riparian habitat (*Forest Plan*, pp. 62-63, 69a, 79-82a, 112, 124124a, 138-138a, 150, 179-179a, 188-188a, Appendix R, and Appendix S).
- Caves (*Forest Plan*, pp. 67 and 230-234).
- Special areas (e.g. scenic, botanical, zoological, national natural landmarks, protected streams, research natural areas)(*Forest Plan*, pp. 69, 198-199, and 210-230).
- Special interest areas (historic, archaeological, and cultural resources; potential Wild and Scenic Rivers; etc.)(*Forest Plan*, pp. 70-71).
- Threatened and endangered species (*Forest Plan*, pp. 84-87a, 179a, 230-234).
- Wilderness (*Forest Plan*, pp. 153-163).

METHODOLOGY

This section addresses how the standards proposed under the four alternatives would affect RFSS. Many factors (e.g. diseases, parasites, weather conditions, acid deposition, etc.) that have the potential to limit populations of RFSS are largely beyond Forest Service control or jurisdiction and are not addressed here.

Each alternative is analyzed to determine the extent to which proposed changes to *Forest Plan* direction could affect RFSS. The analysis is based on the potential for the alternatives to affect populations, individuals and/or habitat conditions in areas occupied by RFSS beyond those effects already considered for the existing *Forest Plan*.

Known distributions of sensitive wildlife and plant populations are established using data sets from the MNF, WVDNR, and WV Natural Heritage Program (WVNHP). Known distributions of sensitive fish populations were established for this analysis by attributing 5th level hydrologic units (HUC's) in ArcView 3.2a with species distribution data from Stauffer et al. (1995) and Chipps et al. (1993).

An analysis of alternatives that are expected to have no effect on a particular RFSS results in a determination of "No impacts" for that species. This situation is most likely when RFSS do not occur in any area that would be affected by the proposed changes in a given alternative. However, if changes proposed by an alternative would apply to areas that are occupied by a particular RFSS, there may be effects to that species. Effects analysis results in a determination of "May impact individuals but is not likely to cause a trend to federal listing or loss of viability" where effects to a particular species are expected to be insignificant (immeasurable) or discountable (extremely unlikely). Effects analysis results in a determination of "Likely to result in a trend to federal listing or loss of viability" where effects are expected to be detrimental and substantial. Effects analysis results in a determination of "Beneficial impacts" where effects are expected to be beneficial.

It is possible that an alternative would result in no impact to one or more RFSS, while detrimentally impacting others or beneficially impacting others. It is also possible that some aspects of an alternative would be associated with beneficial effects to a sensitive species while other aspects of the alternative would be considered adverse effects for the same sensitive species. In these situations, a single determination is made for each RFSS based on the most likely overall effect on the viability of the population.

Effects to RFSS from the *Proposed Threatened and Endangered Species Amendment to the Forest Plan* were considered at the programmatic level. Together, the 87 species designated as RFSS for the MNF are

associated with a variety of habitats found on the MNF, including ponds, streams, wetlands, openings, rock outcrops, cliffs, caves, alpine areas, spruce-fir forest, northern hardwood forests variants, and dry oak and hardwood forest variants. Assessment of how the alternatives provide for protection of known or likely RFSS occurrences was made through 1) a general review of effects that are consistent across all species; 2) and/or by grouping these species by the habitats with which they are associated, and determining how well each alternative guides management of those habitats; 3) and/or looking at individual RFSS and determining effects to that species.

The MNF provides habitat for the following 87 RFSS (4 mammals, 3 birds, 1 reptile, 2 amphibians, 7 fish, 3 mollusks, 26 invertebrates, and 41 plants):

Common Name	Scientific Name	Common Name	Scientific Name
1.Southern Rock Vole	<i>Microtus chrotorrhinus carolinensis</i>	Cave Millipede	<i>Trichopetalum whitei</i>
2.E. Small footed Bat	<i>Myotis leibii</i>	47.Fraser fir	<i>Abies fraseri</i>
3.Allegheny Woodrat	<i>Neotoma magister</i>	48.White Monkshood	<i>Aconitum reclinatum</i>
4.Southern Water Shrew	<i>Sorex palustris punctulatus</i>	49.Arctic bentgrass	<i>Agrostis mertensii</i>
5.Northern Goshawk	<i>Accipiter gentilis</i>	50.Lillydale Onion	<i>Allium oxyphilum</i>
6.Peregrine Falcon	<i>Falco peregrinus anatum</i>	51.Spreading Rockcress	<i>Arabis patens</i>
7.Migrant Loggerhead Shrike	<i>Lanius ludovicianus migrans</i>	52.Cooper's Milkvetch	<i>Astragalus neglectus</i>
8.Timber Rattlesnake	<i>Crotalus horridus</i>	53.Lance-leaf Grapefern	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>
9.Green Salamander	<i>Aenides aeneus</i>	54.Harned's Swamp Clintonia	<i>Clintonia alleghaniensis</i>
10.Hellbender	<i>Cryptobranchus alleghaniensis</i>	55.Showy Lady's Slipper	<i>Cypripedium reginae</i>
11.Redside Dace	<i>Clinostomus elongatus</i>	56.Tall Larkspur	<i>Delphinium exaltatum</i>
12.Candy Darter	<i>Etheostoma osburni</i>	57.Shale Barren	
13.Pearl Dace	<i>Margariscus margarita</i>	Wild Buckwheat	<i>Eriogonum allenii</i>
14.New River Shiner	<i>Notropis scabriceps</i>	58.Darlington's Spurge	<i>Euphorbia purpurea</i>
15.Cheat Minnow	<i>Parahinichthys bowseri</i>	59.Box Huckleberry	<i>Gaylussacia brachycera</i>
16.Appalachia Darter	<i>Percina gymnocephala</i>	60.Appalachian Oak Fern	<i>Gymnocarpium appalachianum</i>
17.Kanawha Minnow	<i>Phenacobius teretulus</i>	61.White Alumroot	<i>Heuchera alba</i>
18.Elktoe	<i>Alasmidonta marginata</i>	62.Crested Coralroot	<i>Hexalectris spicata</i>
19.Organ Cavesnail	<i>Fontigens tartarea</i>	63.Long-stalked Holly	<i>Ilex collina</i>
20.Green Floater	<i>Lasmigona subviridis</i>	64.Butternut	<i>Juglans cinerea</i>
21.A cave beetle	<i>Pseudanophthalmus fuscus</i>	65.Thread rush	<i>Juncus filiformis</i>
22.Timber Ridge cave beetle	<i>Pseudanophthalmus hadenoecus</i>	66.Highland rush	<i>Juncus trifidus</i>
23.A cave beetle	<i>Pseudanophthalmus hypertrichosis</i>	67.Turgid Gay Feather	<i>Liatris turgida</i>
24.Dry Fork Valley Cave Beetle	<i>Pseudanophthalmus montanus</i>	68.Large-Flowered	
25.Gandy Creek cave springtail	<i>Pseudosinella certa</i>	Barbara's Buttons	<i>Marshallia grandiflora</i>
26.A Springtail	<i>Pseudosinella gisini</i>	69.Bog Buckbean	<i>Menyanthes trifoliata</i>
27.A Springtail	<i>Sinella agna</i>	70.Smokehole Bergamot	<i>Monarda fistulosa v. brevis</i>
28.Diana Fritillary	<i>Speyeria diana</i>	71.Canada Mountain Ricegrass	<i>Oryzopsis canadensis</i>
29.Culver's Planarian	<i>Sphalloplana culveri</i>	72.Canby's Mountain Lover	<i>Pachistima canbyi</i>
30.Dry Fork Valley cave pseudoscorpion	<i>Apochthonius paucispinosus</i>	73.Yellow Nailwort	<i>Paronychia virginica v. virginica</i>
31.Cheat Valley Cave Isopod	<i>Caecidotea cannula</i>	74.White Mountain Silverling	<i>Paronychia argyrocoma v albimontana</i>
32.Holsinger's Cave Isopod	<i>Caecidotea holsingeri</i>	75.Swamp Lousewort	<i>Pedicularis lanceolata</i>
33.An isopod	<i>Caecidotea simonini</i>	76.Sword-leaved Phlox	<i>Phlox buckleyi</i>
34.An isopod	<i>Caecidotea sinuncus</i>	77.Jacob's Ladder	<i>Polemonium vanbruntiae</i>
35.A crayfish	<i>Cambarus nerterius</i>	78.Tennessee Pondweed	<i>Potamogeton tennesseensis</i>
36.Hoffmaster's cave planarian	<i>Macrocotyla hoffmasteri</i>	79.Rock Skullcap	<i>Scutellaria saxatilis</i>
37.Greenbrier Valley cave millipede	<i>Pseudotremia fulgida</i>	80.Robust Fire Pink	<i>Silene virginica v. robusta</i>
38.Germany Valley cave millipede	<i>Pseudotremia lusciosa</i>	81.Ammon's Tortula	<i>Syntrichia ammonsiana</i>
39.South Branch Valley cave millipede	<i>Pseudotremia princeps</i>	82.Appalachian Bristle Fern	<i>Trichomanes boschianum</i>
40.Culver's Cave Isopod	<i>Stygobromus culveri</i>	83.Kate's Mountain Clover	<i>Trifolium virginicum</i>
41.Greenbrier Cave Amphipod	<i>Stygobromus emarginatus</i>	84.Nodding Pogonia	<i>Triphora trianthophora</i>
42.Pocahontas cave amphipod	<i>Stygobromus nanus</i>	85.Appalachian Blue Violet	<i>Viola appalachiensis</i>
43.Minute cave amphipod	<i>Stygobromus parvus</i>	86.Sand (Rock) Grape	<i>Vitis rupestris</i>
44.WV Blind Cave Millipede	<i>Trichopetalum krekeleri</i>	87.Netted Chain Fern	<i>Woodwardia areolata</i>
45.Grand Caverns Blind Cave Millipede	<i>Trichopetalum weyeriensiis</i>		
46.Luray Caverns Blind			

All RFSS listed above occur on the MNF. Details regarding these RFSS, their habitat requirements, and their distribution on the MNF may be found in the Biological Evaluation (Appendix G).

Threatened, endangered, proposed, and sensitive species are considered in the design of projects and afforded the highest possible protection commensurate with other appropriate uses and benefits and projects have been implemented to improve their habitat.

Direct & Indirect Effects

The following sections summarize the major effects and determinations disclosed in the Biological Evaluation that has been completed for this proposed amendment to the *Forest Plan* (Appendix G). Greater detail with regard to these effects and determinations may be found in the Biological Evaluation.

No Action

The No Action Alternative is implementation of the existing *Forest Plan*, as amended to date. This alternative would support the Forest's goal for RFSS management, which is to "Protect sensitive and unique species until their populations are viable" (*Forest Plan*, p. 37). The *Forest Plan* provides direction for management of RFSS via Forest-wide threatened and endangered species' standards (p. 87).

Forest activities--such as tree felling and earth disturbance (whether via commercial or non-commercial methods)--have the potential to affect RFSS; but, consistent with existing *Forest Plan* direction, RFSS would be considered in the design of projects and afforded the highest possible protection commensurate with other appropriate uses and benefits. Standards specify that surveys will be done during and as part of normal project reconnaissance and design; if needed, mitigation measures will be made part of the project design when RFSS are present; and data will be collected on RFSS. Forest Service policy also requires biological evaluations to be completed on all projects with the potential to impact sensitive species.

Action could be taken under the No Action Alternative to enhance RFSS habitat. For example, individual trees could be removed around a population of showy lady slipper orchid or running buffalo clover--via non-commercial means--to provide more light for these species. Fence could be installed around sensitive plant populations to prevent deer from removing individuals or destroying populations.

Determination

This alternative may impact individuals that may occur in areas where activities are allowed, but programmatically this impact is considered to be insignificant. Effects analysis results in a determination of "May impact individuals but is not likely to cause a trend to federal listing or loss of viability" for all RFSS on the MNF.

Proposed Action

Effects Related to Proposed Changes for Indiana bat

General effects of implementing this aspect of the Proposed Action on RFSS as a group appear to be minor and predominantly beneficial.

Added protection associated with hibernacula, key areas, and maternity or summer roost trees could directly or indirectly benefit RFSS species that 1) inhabit caves (e.g., Timber Ridge cave beetle, Gandy Creek cave springtail, Dry Fork Valley cave pseudoscorpion, Organ Cave snail); 2) require mature-old growth stands (e.g. Northern goshawk); 3) require snags and/or dead and down material (e.g. Appalachian/Southern water shrew); 3) prefer larger diameter trees; or 4) are sensitive to disturbance (e.g. Eastern small-footed bat, most plant RFSS).

Buffers above and around known hibernacula to protect them from disturbances that might alter water quality or flow, air quality or flow, temperature, and humidity will benefit bats and other cave dwelling

RFSS. Impacts to air or water quality as a result of these buffers or seasonal restrictions (see riparian and aquatics effects) could directly or indirectly affect RFSS fish, mollusks, cave dwelling, and other species (e.g. hellbender) associated with surface or subterranean ponds or streams. Generally, elimination of activities within the area of influence, which produce erosion and sedimentation or smoke that may enter hibernacula, would have beneficial impacts to cave dwelling RFSS. At the same time, seasonal restrictions may generate negative impacts to sensitive fish species due to increased risk for water quality degradation of surface waters.

Implementing proposed standards would further enhance habitat suitability for many terrestrial RFSS species by providing roosting, denning, and cavity nesting at a landscape level. This would occur through the retention of snags, additional residuals, additional large diameter leave trees, cull trees, and greater basal areas within cutting units during all timber management activities. Indirectly, provisions such as longer rotations that would result in mature and older aged stands, and their associated elements (old growth, larger diameter trees, snags, dead and down woody debris, small openings, more open canopies, greater diversity in the understory) would generally result in favorable habitat elements for many RFSS associated with mid-late seral habitats in several different forest types. For example, there would be direct and indirect benefits to terrestrial RFSS requiring snags or cavities because of creation/protection of snags or protection of WV northern flying squirrel “suitable” habitat. Eastern small-footed bats would benefit from standing snags while species such as the Southern rock vole, Appalachian/Southern water shrew, timber rattlesnake, green salamander, and sensitive fish species would indirectly benefit from dead and downed logs after snags fall. Protection of hibernacula and surrounding areas, key areas, and trees with exfoliating bark, would provide habitat favored by Eastern small-footed bats.

Regenerating forests created by acceptable timber harvest under this alternative may also provide additional varieties and numbers of insect prey for all eastern woodland bat species and other insectivores and pollinators, which may benefit RFSS plant species. Plant species (e.g. Long-stalked holly, butternut) that require moderate openings in the canopy may also benefit from some timber harvest.

Seasonal restrictions may further diminish the risk to terrestrial wildlife RFSS that are sensitive to disturbance, as these species are generally inactive or less active during the winter when harvest would occur; may occupy habitat (e.g. caves) where the threat from tree felling is removed; or may not be present on the MNF during the winter. Although it is difficult to determine the degree of benefit achieved through this further reduction, it is believed to be only minimal given the scale, scope and design of harvest activities and protections provided for these types of species elsewhere on the MNF (e.g., MP 5.0 and MP 6.2 areas).

Overlap between Indiana bat primary ranges with habitats of certain RFSS may occur but management for Indiana bat would generally provide parallel, beneficial effects to RFSS found within these habitats.

Protections could conceivably create conflicts with RFSS protection for species that may occur in Indiana bat areas of influence and that require disturbance. Disturbance could be needed, for example, in terms of reducing shade for shade intolerant species, introducing fire for habitat maintenance, or eliminating invasive exotic species. In any case, such conflicts could be resolved in ways that attempt to maintain both Indiana bat and the RFSS at issue. Irreconcilable conflicts between Indiana bat guidelines as proposed and RFSS management goals are not anticipated.

As to maintenance or enhancement of sensitive species’ habitat, the Proposed Action would not prohibit such projects to be accomplished, but additional measures may be taken to ensure adverse effects to endangered and threatened species are avoided.

Effects Related to Proposed Changes for WV northern flying squirrel

Additional programmatic protections, resulting from protection of WV northern flying squirrel “suitable” habitat, may indirectly be afforded RFSS that are associated with alpine or spruce-fir habitats, such as Northern goshawk, Eastern small-footed bat, or Fraser fir. Removal of restrictions on the approximately 33,000 acres of previously identified “occupied” habitat (see threatened and endangered section) most likely will not involve areas of alpine or spruce-fir as this is considered to be “suitable” WV northern flying squirrel habitat. RFSS occurring on these acres would continue to receive the same protections as identified under the No Action.

Surveys are normally conducted for RFSS associated with alpine or spruce fir habitats on a project-by-project basis. Under the Proposed Action, surveys would be unnecessary in WV northern flying squirrel “suitable” habitat. This would result in greater certainty and efficiency in planning and implementing activities, cost savings, and improved protection of RFSS.

Under the Proposed Action, larger, contiguous blocks of this habitat type would be protected. This would indirectly benefit those RFSS that require less fragmented habitats (e.g. northern goshawk).

With a reduction in timber harvest activities in the spruce community type, small-scale habitat features (e.g. talus slopes or rock outcroppings) that may be nested within or immediately next to “suitable” habitat would likely receive some degree of protection that would not exist under the No Action. These features provide habitat for RFSS such as southern rock vole, Allegheny woodrat, or timber rattlesnake, which would potentially receive indirect beneficial effects from additional protections.

As discussed above with Indiana bat, protecting WV northern flying squirrel “suitable” habitat could conceivably create conflicts with RFSS conservation efforts for those species that require disturbance. For example, disturbance could be needed for southern rock vole. As discussed in the No Action section for threatened and endangered species, these conflicts may eventually occur regardless, as more areas are identified as “occupied” given time and additional surveys. Again, such conflicts could be resolved in ways that attempt to maintain both WV northern flying squirrel and the RFSS at issue. Irreconcilable conflicts between WV northern flying squirrel guidelines as proposed and RFSS management goals are not anticipated.

This portion of the Proposed Action would not prohibit projects that maintain or enhancement sensitive species’ habitat, but additional measures may be taken to ensure adverse effects to endangered and threatened species are avoided.

Effects Related to Proposed Changes for VA big-eared bat

Effects would be the same as described under the No Action.

Effects Related to Proposed editorial/administrative changes or clarifications

Editorial/administrative changes associated with this portion of the Proposed Action would have No Impact on RFSS. Many of these protections, such as establishing protective buffers around known threatened and endangered species’ sites, have been implemented in the past under the general language and direction of the existing *Forest Plan*. Standards added give clarity to normal procedural actions. Also, programmatically the scale of these protections is relatively small (~ 4,500 acres) compared to the overall forest acreage and there is little overlap between areas. Consequently, formalizing these protections in the *Forest Plan* would result in minimal change in effects to RFSS species compared to those experienced under the No Action. If there were an impact at all, it would be beneficial, in that MNF goals, objectives, and direction will be more clearly articulated within the *Forest Plan*, and so will heighten awareness and understanding of the threatened, endangered, and sensitive species program and the Forest’s responsibility regarding viability of rare species.

Determination

There are minor differences in relative impact within and among the alternatives. These are discussed in detail in the effects analysis of the Biological Evaluation (Appendix G). Determinations for individual RFSS are documented in the Biological Evaluation and summarized as a group here.

A review of the RFSS on the Forest indicate that many of species, particularly sensitive plants, do not occur in areas that would be effected by the proposed changes, or would not be effected by the proposed changes. This results in a determination of “No impacts” for those species.

Where the proposed changes would apply to areas that are occupied by a particular RFSS, there may be effects to that species. In a few instances, impacts may be considered negative programmatically - although most of these could be avoided or mitigated at the project scale. In either case, effects would be considered minor. In most situations where RFSS occupy areas affected by the Proposed Action analysis reveals that the impacts would be beneficial. Under no circumstances would effects of this alternative be detrimental and substantial thus resulting in a trend to federal listing or loss of viability of any RFSS. Therefore, as a whole, the determination for those RFSS that are impacted by the Proposed Action would be “May impact individuals but is not likely to cause a trend to federal listing or loss of viability.”

Alternative 1

Direct and indirect effects associated with Alternative 1 changes differ from the No Action Alternative in the same manner as described for the Proposed Action with the following exceptions:

Alternative 1 would not incorporate seasonal restrictions thus increased risk associated with erosion and sedimentation would be avoided. Although minimal, adverse indirect effects to RFSS habitat, such as degradation of water quality, would be avoided similar to the No Action Alternative.

Conservation Measures recommended by the USFWS would be incorporated as Forest-wide standards. Incorporating these Conservation Measures into the *Forest Plan* would expand and add emphasis and focus to the MNF’s existing conservation education efforts. Conservation efforts such as these reduce potential risk for negative impacts to RFSS, improve habitat conditions, enhance public knowledge, and broaden citizenry awareness of threatened, endangered, sensitive species and wildlife conservation as a whole. As such, incorporating Conservation Measures would result in beneficial effects to RFSS species and many other wildlife species.

Retaining or creating small pools of water would provide additional sources of drinking water for forest bats (including the Eastern small-footed bat), other RFSS, and many additional wildlife species.

No negative effects are anticipated to other RFSS species from the implementation of these Conservation Measures.

Determination

“No impacts” for those species that do not occur in areas that would be effected by the proposed changes, or would not be effected by the proposed changes.

“May impact individuals but is not likely to cause a trend to federal listing or loss of viability” where the proposed changes would apply to areas that are occupied by a particular RFSS. In a few instances, impacts may be considered negative programmatically - although most of these could be avoided or mitigated at the project scale. In either case, effects would be considered minor. In most situations where RFSS occupy areas affected by the Proposed Action analysis reveals that the impacts would be beneficial. Under no circumstances would effects of this alternative be detrimental and substantial thus resulting in a trend to federal listing or loss of viability of any RFSS.

Alternative 2

Direct and indirect effects associated with Alternative 2 changes differ from the No Action Alternative in the same manner as described for the Proposed Action with the following exceptions.

This alternative would prohibit commercial timber harvests within key areas, within two-mile radii of maternity colonies, and within the primary range of the Indiana bat (Appendix A, p. 32). Under this alternative management of vegetation 5" dbh or greater may be implemented within the primary range of Indiana bats, but only to improve or enhance Indiana bat habitat, to maintain or enhance natural vegetative communities on appropriate sites (see Forest-wide standards and guidelines 1900 – Vegetation), or for public safety. Also, see Indiana bat Zoological Area standards for 2400 (Timber Management) and 2670 (Threatened and Endangered Species that are related to vegetation management. Non-commercial methods of vegetation management (prescribed fire, girdling trees without tree felling) would be used to create a variety of tree species, sizes, and age classes for Indiana bats and other wildlife. Due to potential economic constraints, the total number of acres improved may be less than other alternatives. If economic constraints limit the total number of acres treated this would indirectly result in a negative impact to RFSS and other wildlife species that are early-mid seral species and/or require disturbance. Conversely, those RFSS that are dependent upon mid-late seral stages would likely indirectly benefit from this Alternative. Inability to treat sufficient acres, or provisions that would result in mature and older aged stands, and their associated elements (old growth, larger diameter trees, snags, dead and down woody debris, small openings, more open canopies, greater diversity in the understory) would generally result in favorable habitat elements for many RFSS as described under the Proposed Action although the effect would occur at a broader scale.

Prohibiting commercial timber harvests within the primary range of the Indiana bat has, in theory, the effect of reducing the potential for adverse impacts associated with commercial timber harvests to RFSS that are sensitive to disturbance. Although it is difficult to determine the degree of benefit to RFSS achieved through this further reduction from that described in the No Action, it is believed to be minimal. This alternative would not have negative impacts to water quality as described in the Proposed Action.

Alternative 2 is similar to Alternative 1 in that it 1) incorporates the "Conservation Recommendations" identified in the USFWS's *Biological Opinion*, and 2) it would not impose a seasonal limitation on large-scale tree felling activities (Appendix A, p. 32) within key areas and the primary range. Consequently, for these actions, direct and indirect effects would differ from the No Action in the same manner as described in Alternative 1.

Determination

"No impacts" for those species that do not occur in areas that would be effected by the proposed changes, or would not be effected by the proposed changes.

"May impact individuals but is not likely to cause a trend to federal listing or loss of viability" where the proposed changes would apply to areas that are occupied by a particular RFSS. In a few instances, impacts may be considered to be negative programmatically - although most of these could be avoided or mitigated at the project scale. In either case, effects would be considered minor. In most situations where RFSS occupy areas affected by the Proposed Action analysis reveals that the impacts would be beneficial. Under no circumstances would effects of this alternative be detrimental and substantial thus resulting in a trend to federal listing or loss of viability of any RFSS.

Cumulative Effects

Implementation of the *Forest Plan* since 1986 has resulted in a mix of habitat types being dispersed across the MNF. These habitats support numerous RFSS -- from those species that only utilize open lands, riparian habitat, caves, certain vegetation types, and certain forest structures to those that use two or

more of these habitat types. Regardless of the alternative selected, RFSS habitat on MNF and private lands would continue to be affected by natural succession, land management practices, weather conditions, insects, diseases, wind and ice storms, etc. Such past, present, and reasonably foreseeable future actions have, and will continue to affect the spatial distribution of certain canopy covers, and availability (location and density) of habitat components necessary for the survival or expansion of RFSS (e.g. microclimate condition, cover and nutrient sources, etc). However, none of the alternatives would substantially change the relative amounts or availability of these habitat types and components across the Forest.

Cumulative effects to sensitive species are not expected to deviate substantially from those currently associated with the existing *Forest Plan*. Changes in the potential cumulative effects would be comparable in magnitude to the direct and indirect effects previously discussed for sensitive species under the various alternatives.

None of the alternatives would result in adverse cumulative impacts to RFSS or prevent the achievement of the Forest goal for RFSS management.

MANAGEMENT INDICATOR SPECIES

AFFECTED ENVIRONMENT

A large variety of plants and animals occur on the Forest. The MNF supports populations of deer, black bear, turkey, squirrel, snowshoe hare, as well as a large variety of upland game, furbearers, and non-game species. Migratory game birds and waterfowl are relatively scarce. Both cold and warm water-fishing opportunities are abundant.

The most significant wildlife habitat problem of the MNF is the lack of diversity in habitat and age classes. Less than 30,000 acres of the MNF are non-forested and include openings, roads, water, administrative sites, pastures, and utility rights-of-way. About 74 percent of the forest's timber is between 60 and 105 years of age. Trees less than 70 years age generally have not reached high mast producing capability.

Although the MNF represents less than 10 percent of the forested land in the State, it is extremely important to the wildlife resource of West Virginia. It supplies 80 percent of the State's black bear habitat and 40 percent of the wild turkey habitat.

The following Forest Goal guides management of Management Indicator Species and other MNF wildlife (note: MIS represent a wildlife group that would react similarly to changes in habitat, see Appendix L of the *Forest Plan*):

Forest Goal

“Improve the diversity of plants, animals, and stand conditions with an emphasis on the habitat needs for wild turkey, black bear, and associated species” (*Forest Plan*, Goal IV, p. 38). The *Forest Plan* also provides general direction that fish and wildlife habitats be managed to maintain viable populations of all existing native vertebrate species and to maintain or improve habitat of MIS (*Forest Plan*, p 83).

All of the MPs set up on the Forest have objectives for managing wildlife habitat:

- **MP 2.0** (~17,000 acres) seeks to provide habitat for species associated with shade tolerant vegetation (deer, squirrel, turkey, bear, and associated species) via uneven-aged vegetation management;

- **MP 3.0** (~181,000 acres) endeavors to supply habitat for wildlife species tolerant of disturbances (deer, grouse, squirrel) primarily through even-aged management;
- **MP 4.0** (~900 acres) emphasizes conifer regeneration, thus providing habitat for wildlife associated with the conifer type (varying hare, WV northern flying squirrels, Cheat Mountain salamanders in spruce types; deer and associated species in other types) via even-aged or uneven-aged management;
- **MP 5.0** (~79,000 acres) was designed to preserve natural ecosystems, allowing natural succession to provide habitat for species such as black bear and associated species;
- **MP 6.1** (~424,000 acres) emphasizes remote habitat for wildlife species intolerant of disturbance (black bear, wild turkey, and associated species) primarily via even-aged management, although uneven-aged management may also be implemented;
- **MP 6.2** (~127,000 acres) provides for species requiring a low level of disturbance (black bear) primarily via natural succession; and
- **MP 8.0** (~71,000 acres) attempts to preserve unique ecosystems such as scenic areas, botanical areas, and zoological areas.

This mix of habitats is designed to maintain at least a minimum viable population of all native wildlife species, including endangered and threatened species, on the planning unit.

Although most wildlife habitat management is accomplished by coordinating timber management activities with wildlife habitat needs, wildlife habitat management is also accomplished by direct actions. Creating and maintaining permanent openings, creating brushy openings, constructing wildlife waterholes, planting food and cover plants, releasing mast producing trees, liming, fertilizing, and seeding plots and closed logging roads, and installing nesting and den boxes. Habitat management is also accomplished through a cooperative program with the WVDNR.

Management Indicator Species

The 1986 *Forest Plan* established the MIS approach to wildlife management so that the effects to all MNF wildlife species could be assessed without the complexity of addressing each species individually. As part of the planning process, wildlife species were designated as MIS for the MNF. These were selected in consultation with the WVDNR and the George Washington and Jefferson National Forests. **Criteria and the selections as identified in the 1986 *Forest Plan* FEIS** include:

Endangered Species

1. **Indiana bat** - (*Myotis sodalis*) Hibernates in several caves on the MNF.
2. **VA big-eared bat** - (*Plecotus townsendi virginiana*) Uses several MNF caves for nursery colonies.
3. **WV northern flying squirrel** - (*Glaucomys sabrinus fuscus*) Inhabits high elevations on the Forest, usually where there is a mixture of large hardwoods and conifers. Den trees are important to them.

Species of Special Concern

4. **Cheat Mountain salamander** - (*Plethodon nettingi nettingi*) is an endemic species found only in West Virginia in about 54 small isolated niches (habitats) on the MNF. At the time the *Forest Plan* was approved, this species was a “Species of Special Concern.” Since then, it has been listed as “Threatened” on the USFWS Endangered Species List.

Game Species Preferring Isolation

5. **Black bear** - (*Ursus Americanus*) At the time the *Forest Plan* was approved, bear populations in West Virginia were low. Biologists were concerned and believed shrinking habitat was a major cause. Roads built into relatively inaccessible bear habitat are not the problem but human use on these roads is.

6. **Wild turkey** - (*Meleagris gallopavo silvestris*) Highest turkey populations occur in areas of least human disturbance. Good habitat includes a moderate amount of mature mast bearing trees with little woody understory. Grassy and herbaceous fields are very important as brood range. Harvest records are maintained and collected on a county basis statewide and on a management area basis on the MNF.

Species to Monitor Specialized Habitats

7. **Brook trout** (*Salvelinus fontinalis*) - This species is an indicator of good water quality conditions in cold-water streams (see Riparian and Aquatic Resources section).
8. **Varying (Snowshoe) hare** - (*Lepus americanus*) This species is used as a MIS to follow red spruce ecosystems. It is a hunted game animal. It occurs primarily in the higher elevations and often will reside where hardwoods with a rhododendron understory is the primary habitat.

Species of Game Animals

9. **White-tailed deer** - (*Odocoileus virginianus*) is an important game animal commonly hunted. It indicates early successional stages of vegetation and diversity although many types of habitat are used.

Species to Monitor Old Growth

10. **Gray squirrel** - (*Sciurus carolinensis*) is a game animal that inhabits mast (nuts, fruits, etc.) producing forest land that also contain den trees. Resident populations of gray squirrel rarely occur where den trees are absent.

Using a variety of techniques, the Forest has monitored MIS species and their habitat since 1986. Wildlife monitoring data collected, including changes in available habitat, have been summarized in annual Forest and Fish and Wildlife Monitoring Reports, WVDNR Reports and Recovery Plans. Information from these published reports, as well as on going or unpublished monitoring data, has been reviewed and is incorporated here by reference. Generally, it is believed that population trends on the MNF for all MIS are stable to increasing.

The following summarizes present habitat conditions for the MNF's ten MIS. More detailed discussion regarding the Indiana bat, VA big-eared bat, WV northern flying squirrel, and Cheat Mountain salamander may be found in the Threatened and Endangered Species effects section of this chapter.

1. **Indiana bat** – The Indiana bat occupies 26 known hibernacula in WV (*USFS, September 2001 Revised Biological Assessment*). A revised draft recovery plan has been written, however as of January 2003, it had not been finalized. At the present time, the Indiana bat is in sharp decline throughout almost all of its range. However, based on hibernacula counts, the WV population has increased significantly, more than doubling since about 1980 (USFWS, 2002).
As of January 2003, no confirmed maternity colonies have been found on the MNF; but potential habitat exists within the Forest. Potential roosting habitat (both maternity and non-maternity) is widely available as the MNF is 97% forested with 81% of that being >60 years old.
2. **VA big-eared bat** – In WV, 14 caves are known to be hibernacula, summer maternity sites, or both. Three of those caves are located on the MNF; two of which have been designated critical habitat by USFWS. Virginia big-eared bat hibernacula are surveyed by WVDNR personnel every other year and reported in their Endangered Species Federal Assistance Performance Reports. Results from these surveys indicate that population trends are stable to steadily increasing.
3. **WV northern flying squirrel** – At the time of its listing, only ten WV northern flying squirrel records were known in Randolph and Pocahontas Counties, WV, and two were known from Highland County, VA (Stihler et al. 1995). Subsequent nest box surveys and live trapping done from 1985 through July 1999 in WV found 878 additional WV northern flying squirrels in Greenbrier, Pendleton, Pocahontas, Randolph, Tucker, and Webster Counties (Stihler and Wallace, 1999). As of 2001, over

1,000 WV northern flying squirrels have been captured. WV northern flying squirrels have been captured above 2,640 ft in elevation, which closely parallels red spruce distribution in WV's Allegheny Mountains.

The wide distribution of conifer across the MNF at higher elevations provides suitable habitat for WV northern flying squirrel and for other species that rely upon this forest type. Habitat in the form of mature mixed hardwood/conifer is also found in ecotonal areas surrounding conifer stands and as inclusions within many forested stands as shade tolerant species replace shade intolerant species through natural succession. Additional acres of habitat are likely to develop in similar locations as the mature/late forest community changes due to natural vegetative succession.

4. **Cheat Mountain salamander** – This small woodland salamander is found in red spruce and mixed deciduous forests above 2,600 feet elevation in microhabitats that have relatively high humidity, moist soils, and cool temperatures. About 600 potential Cheat Mountain salamander sites within the MNF have been surveyed by Dr. Tom Pauley, Marshall University. In 2001, Dr. Pauley provided the MNF maps identifying high and low potential habitat, known population locations and areas surveyed in which no Cheat Mountain salamanders were found. About 125 known locations of Cheat Mountain salamander have been documented; several of which have been established as long term monitoring sites.
5. **Black bear** is an indicator of mature/late-successional forests and does best in oak/hickory or mixed mesophytic forests with an understory of blueberry, blackberry, raspberry, rhododendron, and mountain laurel. Habitat for black bear and associated species (see *Forest Plan*, L-2) that rely upon relatively low levels of disturbance and mature/late-successional conditions is a primary management emphasis in MP 6.1 and 6.2 (65% of the MNF). Black bear and associated species are also featured in wilderness, MP 5, 9% of the MNF). Providing habitat requirements of black bear also provides large diameter live and dead trees that can be used as roosts by Indiana bat. Bear population trends continue to be upward and are believed to be consistent with *Forest Plan* projections found in Appendix L. Statewide black bear harvest figures have gone from less than 200 in 1984 to over 1200 in 2001. Populations on the MNF reflect a similar trend.
6. **Wild turkeys** are typically associated with grassy openings, thickets of dense cover, scattered clumps of conifers and extensive tracts of mature/late-successional forests. Turkeys are generally limited to the mid and lower elevation oak, beech, and cherry stands within the MNF.

The amount and location of remote habitat for wild turkey was a major concern in the *Forest Plan* analysis. Wild turkey and/or black bear and associated species (*Forest Plan*, L-2) are to be featured on lands assigned to MPs 6.1 and 6.2 (65% of the MNF). Wild turkey population trends continue to be relatively stable to increasing with annual fluctuations due to mast crop production in any given year. Population levels are believed to be consistent with *Forest Plan* projections found in Appendix L.
7. **Brook trout** - Most cold-water streams on the MNF contain brook trout populations (see Riparian and Aquatic Resources effects). While suitable spawning and resident habitat for this species exists in many perennial streams within the Forest, the quality of habitat may be affected by sedimentation, loss of large woody debris, and acid deposition, which reduce the productivity of streams (note: sediment effects are described in the Riparian and Aquatic Resource effects).

The distribution of wild trout on the MNF has likely been reduced in drainages that are poorly buffered and affected by acid deposition (see Riparian and Aquatic Resources effects). Populations on the rest of the Forest are largely stable, but a number of factors like poor habitat quality, angling pressure, weather conditions that affect water flows, etc. affect their productivity and depress their populations. Because of such factors, it is not likely that many streams on the Forest are at their biological potential. The distribution of fish may be stable, but as long as productivity is impaired, populations are susceptible to other natural and management related events. Riparian and watershed

protection and restoration measures have been, and will continue to be, implemented to improve wild trout productivity and ensure their continued viability.

8. **Varying (Snowshoe) hare** - The habitat of the snowshoe hare within the Forest varies and is greatly affected by the forest type and frequency of disturbance. Snowshoe hare are indicators of late (10-20 year old) early succession, high elevation hardwood/conifer ecosystems and found often in ecotones on the Forest. Snowshoe hare occurs in second-growth beech/birch/maple forests and in young, dense red spruce stands, both with dense rhododendron cover. It is estimated that the Forest provides in excess of 60,000 acres of these habitat types. In either case, hare populations flourish if disturbances create situations where dense stands of young conifers or brushy deciduous growth provide abundant food and cover. They feed primarily on beech, birch, blueberry brambles, grasses, hemlock, high-bush cranberry, maples, red spruce, rhododendron and serviceberry. In the winter when snow is deep, they are forced to prune higher branches. Their winter diet consists of small twigs, buds, and bark. Maple, birch, rose, hazel, aspen, and willow are highly palatable deciduous species, whereas spruce, white pine, and cedar are favored conifers. When, in the absence of disturbance, forests have matured, hare numbers tend to be low; and small isolated populations are usually associated with bog edges and other natural openings that may support patches of willow, alder, hazel, and other low-growing woody vegetation.

Snowshoe hare is a WV small game species with a daily bag limit of two. However, WVDNR no longer tracks annual harvest numbers. Basically solitary, except when breeding, this species is difficult to monitor. In some areas, populations fluctuate widely over a 10-11 year cycle. Densities may vary from one to several hundred per square mile (Keith and Windberg 1978). See Sinclair et al. (1988) for recent data on population dynamics and food quality and supply (NatureServe Explorer, 2002). The Forest is currently working with the Northeast Forest Experiment Station in Parsons, WV to develop a monitoring plan for snowshoe hare to replace harvest information previously collected by WVDNR.

More data are needed to determine population trends for this species although current information suggests that populations are stable and habitat is of sufficient quality, distribution, and abundance to allow the species population to persist but with possible gaps in the historic distribution of the species on the MNF. The *Forest Plan* recognized that forest stands would continue to mature over time. As they do, and as lack of disturbance influences their characteristics, preferred habitat for the Snowshoe hare may decline. This decline may be offset as natural succession towards red spruce proceeds and natural disturbances provide additional areas of young stands.

9. **White-tailed deer** - This MIS is a generalist that uses many habitat types (early successional forest, mature forest, deciduous and conifer forests, riparian, openings, etc.) and is often associated with species like those listed on page L-2 of the *Forest Plan* (e.g. ruffed grouse, gray fox, red fox, mink, weasels, etc.). Deer rely on a mosaic of forested and non-forested ecosystems providing cover and foraging habitat. Deer often occur along edges and small clearings within wooded areas created by disturbances such as logging, drilling, or fires. Habitat for species that rely upon early successional conditions is provided primarily in permanent managed openings, natural openings, and even-age regeneration harvests that occur throughout the MNF. Tree harvesting typically converts forested cover into early successional stages of vegetation that function as important foraging areas. Given deer population trends, habitat on the Forest appears to be meeting white-tailed deer food, cover, and water needs. Deer harvests have steadily increased statewide since the early 1970's going from <50,000 to record levels in excess of 200,000 (WVDNR Big Game Bulletin, 2001). Populations have remained above objective levels throughout the MNF for more than 20 years. Harvest of antlerless deer, a tool that WVDNR has used regularly in the recent past, has been shown to be the most effective means of managing deer populations.

10. **Gray squirrel** - This mature/late successional or old growth forest species is found in most woodland areas, especially oak, hickory, and beech forests, which provide food throughout much of the year and an abundance of den and cavity trees.

About 90% of the Forest is currently typed as oak and northern hardwoods capable of hard mast production, predominately by oak and beech. Historic large-scale disturbances in the late 19th and early 20th centuries (extensive logging, wildfires and chestnut blight) created an abundance of early seral habitat in a relatively compressed timeframe. Today, the majority of the forest (~81%) has now matured to 60 + year old stands that provide an abundance of hard mast-producing habitat.

Squirrel and associated species are to be emphasized in oak-hickory stands assigned to MP 3.0.

This game species is the most popular game animal in WV with annual harvests approaching 2 million. Although yearly harvests are no longer tracked, gray squirrels are well distributed throughout the MNF and populations appear stable with a high likelihood of persistence. Annual population fluctuations are normal and occur in response to the abundance of hard mast the preceding year. Population trends more closely correlate to environmental factors driving mast production than to effects of management activities. Bumper crops result in population explosions and mast failures suppress numbers.

METHODOLOGY

The effects that each alternative would have on the Forest's MIS and the Forest's wildlife management program are addressed in three ways. First, wildlife habitat at the landscape scale was evaluated using a coarse filter approach. The mix of acres found in MPs is designed to maintain at least a minimum viable population of all native wildlife species, including endangered and threatened species, on the planning unit. Changes in MP acres were evaluated to determine whether substantial changes would be made in the way general areas are managed, which would affect the viability of indicator species relative to the *Forest Plan's FEIS* determination. Second, since species' viability is also closely correlated with diversity of habitat (successional stages and community types) found at the landscape and watershed scale on the Forest, effects described in the Forest Type and Age Class Diversity were reviewed to determine how each alternative may result in habitat changes that may affect MIS. Third, a fine filter approach was used as needed to assess the alternatives' potential impacts to those physical or biological features found at the microhabitat scale (habitat elements required such as snags/clumps; dens, roost trees, reproductive or rearing sites, bogs, etc.) and determine effects of specific standards on these elements or whether the action alternatives adequately provide these required elements programmatically.

Common to all alternatives would be the protection of Cheat Mountain salamanders. If Cheat Mountain salamanders were found during site-specific analysis of projects, they and their habitat would be avoided. Also, additional information regarding effects on threatened and endangered species may be found in the Threatened, Endangered, and Sensitive Species sections of the EA.

DIRECT & INDIRECT EFFECTS

No Action Alternative

The No Action Alternative is the direction currently guiding wildlife management of the MNF. MP allocation would remain unchanged. There would be no expected effects to the wildlife management program or to MIS beyond those predicted in the *Forest Plan FEIS*--with the exception of Indiana bat. The *Revised Biological Assessment*, which assessed effects of continued implementation of the *Forest Plan* on threatened and endangered species, determined that implementation of this alternative would result in a may effect, not likely to adversely effect for the VA big-eared bat, Cheat Mountain salamander, and WV northern flying squirrel. However, the no action alternative has been determined to may effect, likely to adversely affect the Indiana bat based upon direct effects incurred when felling potential roost

trees. Population trends of Indiana bat in WV are stable to increasing, and although USFWS, in their *Biological Opinion*, concluded that the proposed action is not likely to jeopardize the continued existence of the Indiana bat, the No Action may result in harm (take) to individual Indiana bats and could lead to violation of the ESA by the Forest. This alternative would not comply with the “Terms and Conditions” of the *Biological Opinion and Incidental Take Statement*.

Under this alternative, the Forest would remain a relatively even-aged forest made up of a wide variety of flora and fauna species as predicted in the *Forest Plan FEIS*. Current routine management activities would continue. Existing wildlife openings would be maintained and new openings could be created until up to 5% of the Forest was in openings. Natural events such as “blow down” would still occur and may open small areas, creating short-term conditions similar to constructed openings. Edge conditions would continue to be provided as they have been in the past. Existing roads and trails would continue to be maintained. Late successional habitat would increase and older growth conditions would become more common favoring species dependent upon mature and late successional habitats.

All MIS would be expected to have a moderate to high likelihood of persistence.

Proposed Action

Overall, the Proposed Action may cause minor impacts to habitat (total acres, distribution of acres, diversity of successional stages and community types found at the landscape and watershed scale, and micro-habitats) for several MIS. However, when these effects are considered at the programmatic level, effects would not be substantially different from those described in the *Forest Plan FEIS* and would fall within the range of alternatives described in the *FEIS* (all of which were determined to provide for viability of indicator species). The likelihood of persistence for all MIS, with the exception of the Indiana bat and WV northern flying squirrel, would not change under this alternative. The Indiana bat and WV northern flying squirrel would incur beneficial effects, thus would have a higher likelihood of persistence than under the No Action. Minimum viable populations of all MIS would be maintained.

Under this alternative, the existing *Forest Plan* would be amended to incorporate the “Terms and Conditions” of the *Biological Opinion* and implement the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)*.

The main effects of the Proposed Action come from the following proposed standards found in Appendix A.

Changes in MP acres

Forest wide #9, #9 (b)(c), #13 (c)(1), #13 (g)(1)

The Proposed Action would reassign some acres of NFS land that are currently designated as MP 2.0, 3.0, 6.1, and 7.0 to MP 6.3. The overall mix of acres found in MPs would not change to the extent that there would be a change in viability of any species from the No Action.

The greatest change to MPs would come in the designation of areas of influence for all threatened, endangered, and proposed species or populations to assist in their recovery--specifically the areas of influence for Indiana bat and WV northern flying squirrel. Hibernacula, maternity colonies, and key areas of the Indiana bat would be managed under MP 8.0 and Zoological Area standards for Indiana bats. The primary range of the Indiana bat would be managed under MP 6.3 direction and standards. The area of influence for WV northern flying squirrels would be recognized as their “suitable” habitat as defined by the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)* and would be assigned to MP 8.0, Zoological Area 832. Forest wide, MP 8.0, and Zoological standards for WV northern flying squirrels would be used to manage this species’ populations.

Indiana bat and WV northern flying squirrel are likely to incur beneficial effects (direct and indirect). Cheat Mountain salamander would incur indirect beneficial effects from protection of WV northern flying squirrel habitat. Management on these acres would not substantially change with regard to other MIS.

The bulk of these acres (~151,000) would come from MP 6.1 and would continued to be managed to provide remote habitat for wildlife species intolerant of disturbance (black bear, wild turkey, and associated species) under longer rotation periods. Standards proposed for MP6.3 would closely parallel existing MP6.1 standards. Programmatically, primary emphasis on the Indiana bat should be consistent in most cases with the objective of providing remote habitat for these species. The most notable change would come from MP 3.0 (~48,000 acres), which would endeavor to supply habitat for wildlife species tolerant of disturbances (deer, grouse, squirrel) primarily through even-aged management. Again, the general direction and standards proposed in MP6.3 would be consistent with MP3.0 to the extent that viability of any MIS would be in question. Longer rotations should provide additional mast and denning/nesting opportunities and would usually be more conducive for the establishment of vertical structure under the canopy (*FEIS*, p. 4-33). Vertical stratification or layers, provide additional ecosystems that increase wildlife variety.

Primary emphasis on the Indiana bat should be consistent in most cases with the wildlife objective identified for MP3.0. White-tailed deer and gray squirrel are featured species within MP 3.0 and, as the affected environment indicated, these species are relatively secure on the Forest. WV northern flying squirrel “suitable” habitat would be managed similar to the current situation of known occupied habitat; the distribution of these acres would change to better reflect actual habitat used. Differences in acres and distribution programmatically should have little effect on other MIS.

It is likely that uneven-aged management would continue to be applied on any areas assigned to MP 2.0 that would be managed as MP 6.3 (Silvicultural Report) and that these would be consistent with the primary emphasis of Indiana bat and not inconsistent with the featured MIS within this MP.

Since land in Indiana bat primary habitat previously designated as MP 5.0, 6.2, or 8.0 would not be subject to the proposed standards that would allow for active timber management, there would be no change of purposes for these areas and these areas would continue to provide habitat for featured species as identified in the *Forest Plan* and *Forest Plan FEIS*.

Active management of forested stands for age class diversity through commercial timber management is allowed in MP 2.0, 3.0, 4.0, and 6.1 areas. However, without intensive and expensive surveys for WV northern flying squirrel, it is unlikely that areas of “potentially occupied habitat-high potential suitability” (1990 *Recovery Plan* direction) would be managed for commercial timber under the No Action Alternative due in part to the potential of “take.” These specific areas under the No Action are analogous to “suitable” habitat (*Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)*) identified in the Proposed Action. Therefore, no substantial change would occur even with the Proposed Action standards that would alter the distribution and number of acres managed for WV northern flying squirrel.

In summary, no substantial changes in MPs, or in the way MPs are managed, would occur which would negatively effect the ability of the Forest to provide minimum viable populations of MIS.

Diversity of habitat

MP 6.3: 1900 #3; 2400 #1; 2470 #1; 2600 #1,3, and 5; Zoological #3(a)

The primary effect of this alternative on MIS because of seasonal restrictions to reduce the chance of “taking” a roosting Indiana bat would be in those areas designated MP 6.3. Tree felling for large-scale activities (e.g. most timber sales, construction of collector and arterial roads, etc.) would be prohibited within the primary range between April 1 and November 15. As described in the Soil and Water, Timber Sale Program, and Silvicultural sections, this alternative may hinder activities to provide diverse successional stages and community types needed by MIS in certain areas of the Forest. This is the normal operating season for commercial timber harvest contracts. Silvicultural treatments during this time would likely lead the Forest to (1) offer timber sales within MP6.3 as part of helicopter sales that are normally offered each year; (2) consider offering more commercial timber sales in which timber is yarded by helicopter; or (3) harvest fewer acres of timber. Helicopter logging may increase disturbance to some

species such as white-tailed deer, especially in critical winter months. However, timbers sales operated by helicopter during these months have been and continue to be a tool to mitigate effects to other resources without noticeable impacts to these species.

The de-emphasis on clearcut harvesting and emphasis on treatments which are more favorable to Indiana bat use within Indiana bat primary range would not result in large effects to the ability to manage forest types and age classes (Forest Type/Age Class Diversity and Silvicultural Program effects of this chapter). The emphasis to use primarily shelterwood and two-age regeneration harvest methods is a continuation of a current trend and would likely provide no effect or beneficial effects to MIS.

Standards associated with old growth habitats would not substantially change the character or amount of old growth on the Forest (Forest Type/Age Class Diversity and Silvicultural Program effects). Old growth would be more strategically located for the Indiana bat under the Proposed Action. Identifying key areas of old growth would benefit the Indiana bat but would have minimal effect on other MIS.

The proposed guideline to have no more than 7.5% of the area in the 0-14 year age class is no different than current *Forest Plan* standards for MP 6.1 and other areas; it would be consistent with balanced age classes and rotation period standards found in the No Action (see Forest Type and Age Class Diversity description of effects). However, the spatial distribution of these early successional habitats may also change. The shift in location of these habitat types should have minimal effect on MIS at the programmatic scale.

Currently MP 2.0, 3.0, 4.0, and 6.1 call for 5% of the area to be managed in permanent openings. Reassigning lands from these prescriptions to MP 6.3 or Zoological Areas for Indiana bats under the Proposed Action may affect where permanent openings may be placed, but it would not change the number of acres that could be maintained as openings across the planning area.

All other effects regarding diversity of successional stages and community types across the landscape are as those under the No Action.

In summary, the Proposed Action would provide diverse habitats across the Forest sufficient to maintain viable populations of MIS. Locations and size of these habitats would better provide for the needs of threatened and endangered MIS.

Microhabitat

Forest-wide: #8; #11; #13(b)(2); #13 (c)(3)(4)(5)(6)(7)(8)(13); #13 (d), MP6.3: 1900 #4; 2470 #4,5,6; 2600#4; others.

Implementation of these proposed standards such as #13 (c)(3)-- Retain all shagbark hickory trees in cutting units except where public safety concerns exist—would provide additional required habitat components for Indiana bat. Retention of shagbark hickories forest-wide would not be substantially different from the No Action in effects to MIS (see Timber Sale Program effects). Standard #13 (c)(4) requires that snag retention in cutting units be monitored and if an average of less than 6 snags/acre with 9" dbh exists manually create additional snags. Again, this is similar to the No Action in that current standards in MP3.0 require 3-5 snags and MP 6.1 requires all snags to be retained. In most areas of the Forest, this number of snags exists, but in those areas where they do not, this standard would provide additional roosting, denning, and nesting opportunities for many MIS species.

Standards to retain residual trees at 9 to 16 inches dbh and >16 inches dbh and to leave a component of the largest trees in the stand when designing even-aged regeneration harvest units (shelterwood, two-age, and clearcuts) would not be substantially different than current prescriptions. It is expected that this would contribute toward better quality habitat for species requiring larger diameter trees (Indiana bat, black bear, gray squirrel, Cheat Mountain salamander, WV northern flying squirrel).

Within areas with greater snag densities and larger trees, an abundance of den trees, cavity trees, large dead trees, and large trees with loose bark would be available. This would benefit MIS species such as VA big-eared bat, Indiana bat, and WV northern flying squirrel, Cheat Mountain salamander, black bear, gray squirrel as well as other wildlife species that depend on cavities or loose bark to find shelter and breeding/nesting sites.

The intent of these proposed standards and others like them are to provide the key microhabitats or elements required by the Indiana bat across the Forest. Application of these standards would generally benefit those species that also require similar components such as cavity nesting birds, black bear, and gray squirrel. Indirectly, Cheat Mountain salamander and wild trout may benefit over time as snags or large trees fall to the ground or within ephemeral drainages or permanent streams. Providing these microhabitats would not affect or nominally affect other MIS.

All other effects regarding microhabitat or individual habitat elements for MIS across the landscape are as those under the No Action.

In summary, the Proposed Action would provide diverse microhabitats across the Forest sufficient to maintain viable populations of MIS. Supplying these components across the Forest would better provide for the needs of threatened and endangered MIS.

Alternative 1

Like the Proposed Action, Alternative 1 may cause minor impacts to habitat (total acres, distribution of habitats, diversity of successional stages and community types found at the landscape and watershed scale, and micro-habitats) for several MIS. However, when these effects are considered at the programmatic level, effects would not be substantially different from those described in the *Forest Plan FEIS* and would fall within the range of alternatives described in the *FEIS*. The likelihood of persistence for all MIS, with the exception of the Indiana bat and WV northern flying squirrel, would not change appreciably under this alternative. The Indiana bat and WV northern flying squirrel would incur beneficial effects, thus would have a higher likelihood of persistence than under the No Action. Likelihood of persistence for the Indiana bat would be slightly less in this alternative than the Proposed Action due the removal of seasonal restrictions on felling trees while bats may be roosting.

Minimum viable populations of all MIS would be maintained.

Under this alternative, the existing *Forest Plan* would also be amended to incorporate the “Terms and Conditions” of the *Biological Opinion* and implement the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)*.

The main effects of Alternative 1 come from the following selected proposed standards found in Appendix A.

Changes in MP acres

Forest-wide #9, #9 (b)(c), #13 (c)(1), #13 (g)(1)

Like the Proposed Action this alternative would reassign some acres of NFS land that are currently designated as MP 2.0, 3.0, 6.1, and 7.0 to MP 6.3. Although MP designations would change, the mix of habitats they provide would not substantially change from the No Action. No change is anticipated from the Proposed Action in providing minimum viability for all native wildlife species, including endangered and threatened species, on the planning unit due to the reassignment of MPs and acres within MPs. As in the Proposed Action, primary emphasis on the Indiana bat in MP 6.3 would be consistent programmatically with the objective of providing habitat for other indicator species. All other effects are as those described under the Proposed Action.

Diversity of habitat

MP 6.3: 1900 #3; 2400 #1; 2470 #1; 2600 #1, 3, 5; Zoological #3(a)

The major difference for MIS between the Proposed Action and Alternative 1 is that Alternative 1 would not impose a seasonal restriction on large-scale tree felling within the primary range (MP 6.3) to reduce the chance of “taking” a individual, roosting Indiana bat. Large-scale tree felling would generally occur under the Incidental Take Statement issued by USFWS. With the removal of seasonal restrictions, concerns raised with winter logging could be avoided (Silviculture, Soils and Water, Riparian and Aquatic Resources, Timber Sale Program effects). Large-scale timber harvest activities would continue to provide a mix of habitats similar to what has occurred in the past. Consequently, the Forest would remain a relatively even-aged forest made up of a wide variety of flora and fauna species as identified in the *Forest Plan*. Without seasonal restrictions, the Forest could provide greater diversity in the way of early successional habitats, especially in a spatial sense, than in the Proposed Action (Silviculture, Soils and Water, and Riparian and Aquatic Resources effects) due to the ability to harvest on sensitive soils during dry periods. Current management activities would continue although the location or distribution of these activities may also slightly change due to emphasis on Indiana bat within MP6.3.

All other effects would be as those described under the Proposed Action.

In summary, Alternative 1 would have minor impacts to habitat for several MIS. In the case of Indiana bat and WV northern flying squirrel, locations and size of these habitats would better provide for the needs of these threatened and endangered MIS. Alternative 1 would provide diverse habitats across the Forest sufficient to maintain viable populations of all MIS.

Microhabitat

Forest-wide: #8; #11; #13(b)(2); #13 (c)(3)(4)(5)(6)(7)(8)(13); #13 (d),
MP6.3: 1900 #4; 2470 #4,5,6; 2600#4; others

Retaining or creating small pools of water during road abandonment, where appropriate, given other resource concerns would provide additional sources of drinking water for forest bats.

Other effects would be as described in the Proposed Action.

In summary, Alternative 1 would provide diverse microhabitats across the Forest by way of specific standards sufficient to maintain viable populations of MIS. Additional water sources would be provided under this alternative. Supplying these components across the Forest would better provide for the needs of threatened and endangered MIS and other associated wildlife species (*Forest Plan*, L-2).

Alternative 2

Effects are largely the same as in the Proposed Action and Alternative 1 with one addition. Alternative 2 proposes to exclude timber management in the primary range, key areas, and area within two-mile radii of a maternity colony of Indiana bat. This would exclude commercial silvicultural tools (Indiana bat Zoological standard 2400 #1, page 32, Appendix A). Non-commercial silvicultural actions may still be implemented if compatible with Indiana bat habitat needs. An indirect effect of this alternative may be that fewer acres of early successional habitat would be created due to the unavailability of commercial harvest as a management tool in providing diversity of habitat types and elements. This would only occur within the primary range of the Indiana bat, and the remainder of the Forest could be treated through commercial harvest much as it is currently. In Indiana bat Zoological Areas, vegetation would move toward more shade tolerant types in the absence of human disturbance factors that create earlier successional habitat.

Under this alternative, the existing *Forest Plan* would be amended to incorporate the “Terms and Conditions” of the *Biological Opinion* and implement the *Appalachian Northern Flying Squirrels’ Recovery Plan (Updated)* as well as additional protective measures for Indiana bat habitat.

This alternative would avoid most direct effects on Indiana bat resulting from large-scale activities. Alternative 2 would have minor impacts to habitat for several MIS. In the case of Indiana bat and WV northern flying squirrel, locations and size of these habitats would better provide for the needs of these threatened and endangered MIS. Although the location of certain habitat types may change, overall Alternative 2 would continue to provide diverse habitats across the Forest sufficient to maintain viable populations of all MIS. Probability of persistence would increase for MIS requiring isolation and/or late successional habitat.

Changes in MP acres

Forest-wide #9, #9 (b)(c), #13 (c)(1), #13 (g)(1), Zoological #2.

This alternative would reassign some acres of NFS land that are currently designated as MP 2.0, 3.0, 6.1, and 7.0 to Indiana bat Zoological Areas. Indiana bat Zoological Areas would be defined as: A five-mile radius around hibernacula that contains the following elements: 1) hibernacula (caves and cave entrances); 2) key area (area near hibernacula that includes mature stands); 3: primary range (stands adjacent to key area, up to five-mile radii from cave entrances); and/or land within two-mile radii of a maternity colony for the Indiana bat, unless consultation with the USFWS on a site-specific basis indicates otherwise.

Although MP designations would change, the mix of habitats they provide at the Forest scale would not substantially change from the No Action. No change is anticipated from this alternative in providing minimum viability for all native wildlife species, including endangered and threatened species, on the planning unit due to the reassignment of MPs and acres within MPs. This alternative would provide the highest level of probability of persistence for the Indiana bat, as it would minimize the potential for “take” and maximize the protection of roosting habitat. As in the Proposed Action, primary emphasis on the Indiana bat in Zoological Areas would be consistent programmatically with the objective of providing habitat for other indicator species although this alternative would have the greatest impact on other MIS.

All other effects would be as those described under the Proposed Action.

In summary, Alternative 2 would have greater impacts with respect to direct effects on Indiana bat and indirectly to habitat for Indiana bat and several other MIS. In the case of Indiana bat and WV northern flying squirrel, locations and size of these habitats would better provide for the needs of these threatened and endangered MIS. Alternative 2 would provide diverse habitats across the Forest sufficient to maintain viable populations of all MIS.

Diversity of habitat

MP 6.3: 1900 #3; 2400 #1; 2470 #1; 2600 #1, 3, 5; Zoological #2, 2400 #1

The major difference for MIS between the Proposed Action and Alternative 2 would be that Alternative 2 would designate the primary range of Indiana bat as Zoological Areas and prohibit commercial timber harvests within the primary range and key areas. This alternative would minimize the potential for “take” and maximize the protection of roosting habitat. Additionally, it would favor those MIS associated with remote habitats and later successional stages such as Indiana bat, black bear, and gray squirrel.

Non-commercial silvicultural actions may still be implemented if compatible with Indiana bat habitat needs. Large-scale tree felling could occur under this alternative following the provisions of the Incidental Take Permit issued by USFWS and would ensure a no jeopardy ruling. Concerns raised with winter logging within the primary range would be avoided (Silviculture, Soil and Water, Riparian and Aquatic Resources, Timber Sale Program effects). Non-commercial silvicultural actions to benefit Indiana bat within five-mile radii of the hibernacula may be less economically feasible. An indirect effect

of this alternative may be that fewer acres are created in early successional habitat due to the unavailability of commercial harvest as a management tool in providing diversity of habitat types and elements. The remainder of the Forest could be treated through commercial harvest much as it is currently or additional treatments may occur in the remainder of the Forest to compensate for restrictions in Indiana bat Zoological Areas. This may indirectly affect those MIS (such as white-tailed deer and wild turkey) requiring early successional habitat -- if not through the availability of habitat then at the least the spatial location of these habitats. However, overall the Forest would continue to provide a mix of habitats sufficient to maintain minimum viable populations of all MIS. Probability of persistence would increase for Indiana bat, WV northern flying squirrel, gray squirrel, and those MIS requiring isolation.

All other effects are as those described under the Proposed Action.

In summary, Alternative 2 would have minor impacts to habitat for several MIS. In the case of Indiana bat and WV northern flying squirrel, locations and size of these habitats would better provide for the needs of these threatened and endangered MIS. Although the location of certain habitat types may change overall Alternative 2 would provide diverse habitats across the Forest sufficient to maintain viable populations of all MIS.

Microhabitat

Forest-wide: #8; #11; #13(b)(2); #13 (c)(3)(4)(5)(6)(7)(8)(13); #13 (d), MP6.3: 1900 #4; 2470 #4,5,6; 2600#4; others.

Retaining or creating small pools of water during road abandonment, where appropriate given other resource concerns, would provide additional sources of drinking water for forest bats and many other wildlife species.

Other effects would be as described in the Proposed Action.

In summary, Alternative 2 would provide diverse microhabitats across the Forest by way of specific standards sufficient to maintain viable populations of MIS. Additional water sources would be provided under this alternative. Supplying these components across the Forest would better provide for the needs of threatened and endangered MIS and other associated wildlife species (*Forest Plan*, L-2).

CUMULATIVE EFFECTS

Cumulative effects related to wildlife were evaluated by looking at past, present, and reasonably foreseeable future effects, which are most likely to result in a change in wildlife habitat conditions and wildlife distribution and use when considered cumulatively. When considering the effects to wildlife over time, and based on past and anticipated future disturbances on the Forest, the primary factors of change affecting wildlife and wildlife habitat on the Forest and surrounding landscape are even-aged regeneration harvest, road construction, and possible impacts related to gypsy moth infestation. Blow down, insect, and disease are naturally occurring cumulative effects.

Implementation of the *Forest Plan* since 1986 has resulted in a mix of habitat types dispersed across the MNF. These habitats support a wide variety of wildlife species, from those needing open lands to those requiring all successional stages of forest. Reasonably foreseeable actions resulting from implementation of any of the alternatives might affect the spatial distribution of early or late successional habitats, old growth and certain forest canopy closures. There would, however, be no change in the relative amounts of these habitat types available across the Forest. Therefore, there would be no cumulative impact to MIS, associated wildlife populations or the wildlife program as a whole. Minimum viable populations of all MIS and associated species would be maintained.

The No Action Alternative would not be compliant with the Endangered Species Act because existing *Forest Plan* standards for Indiana bat do not minimize the potential for taking an individual Indiana bat, and WV northern flying squirrel standards are not consistent with the recently amended *Appalachian Northern*

Flying Squirrel Recovery Plan (Updated) (USFS, Sept. 2001 Revised Biological Assessment and Forest Plan, pp. 84, 86, 87, 230, 234, and Appendix X). All other alternatives would be compliant with the ESA.

FOREST TYPE & AGE CLASS DIVERSITY

AFFECTED ENVIRONMENT

Maintaining a diversity in age classes and forest types, and perpetuating current forest types is part of *Forest Plan* goal statement # IV – Wildlife. This goal has two parts.

Forest Goal

The first part is to manage habitat to help recovery of threatened and endangered species and protect sensitive and unique species on the MNF (*Forest Plan*, p. 38). The goal for other wildlife habitats is to “Improve the diversity of plants, animals, and stand conditions with an emphasis on the habitat needs for wild turkey, black bear, and associated species.”

Existing Forest-wide standards give further direction: “It is the ultimate goal of the Forest to balance age classes of the primary forest types on all capable, available, and suitable lands on which even-aged management is applied” (*Forest Plan*, p. 74). Other guidelines are given under 2410 Timber regulations for individual MPs where timber harvest is allowed. These relate to the forest-wide goal of balancing age classes and give specifics on rotation lengths and entry cycles.

Generally, commercial timber harvest has been the means by which the Forest manages age class distribution and to some extent forest type on lands available and suitable for commercial timber management. The *Forest Plan* prescribes commercial timber management on ~36% (~331,000 acres) of the Forest. The remaining 64% of the MNF is expected to change primarily through natural events and succession. On ~23% of the MNF (Wilderness and MP 6.2, where semi-primitive, non-motorized recreation is emphasized), natural forces are the disturbance factors expected to impact forest type and age class diversity.

Projected Outputs

The *Forest Plan* predicted that during the first decade of implementation the Forest would use both even-aged and uneven-aged regeneration harvest on ~2,000 acres a year and thin ~4,000 acres a year (p. 44). From 1987 to 1998, the annual average was ~4,000 acres (both regeneration and thinning) managed by commercial timber harvest. This has been declining annually; from 1995 to 1998, the annual average was ~2,000 acres managed by commercial timber harvest.

The *Forest Plan* allocated land to specific MPs, each with certain desired conditions and associated outputs. Each MP has a primary emphasis that guides management of forest resources in the area. Active management (commercial and non-commercial) of forest types and age classes occurs in MPs 2.0, 3.0, 4.0, and 6.1 at various intensities and for differing reasons.

1. Forested lands under MP 2.0 emphasizes a continuous forested scene, mainly shade tolerant tree species, and uneven-aged silvicultural techniques.
2. MP 3.0 emphasizes production of commercial, large diameter, hardwood trees and animals tolerant of disturbance.
3. MP 4.0 emphasizes management of existing conifer stands.
4. MP 6.1 makes up about half the MNF. It emphasizes remote habitats for wildlife species intolerant of disturbance and a mix of forest products.

Figure 1 shows the distribution of land to MPs (*the category “Other” includes MPs 2.0, 4.0, & 7.0).

Figure 1 – Existing distribution of land to MPs.

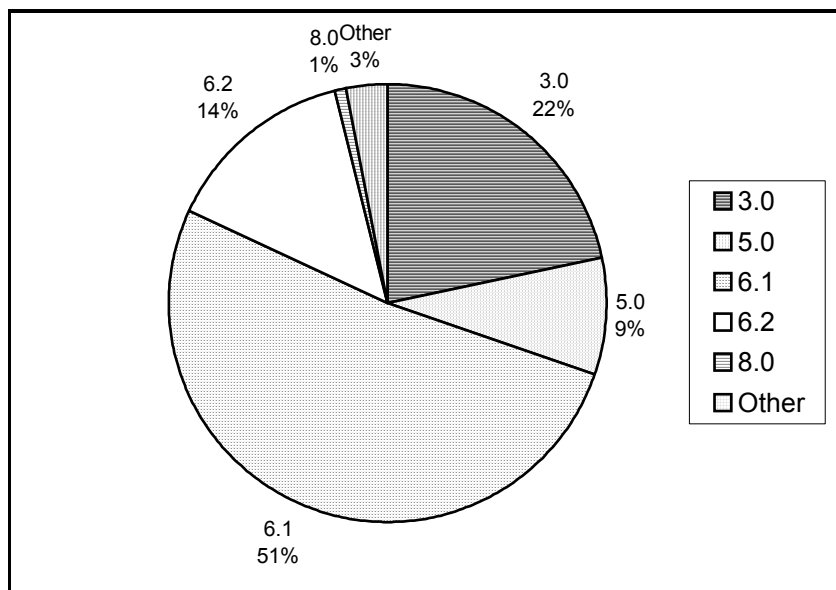
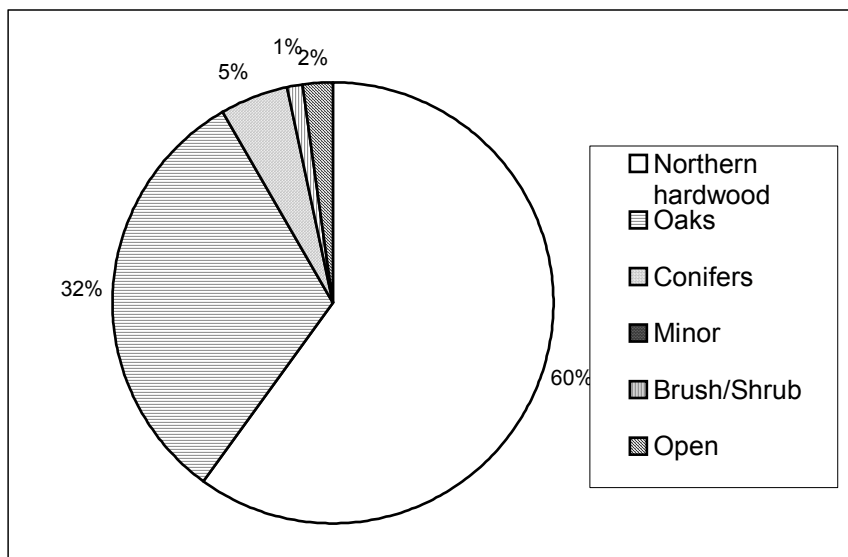


Figure 2 and 3 display the distribution of forest types and age classes forest-wide.

A variety of tree species occur on the MNF. Forested stands may be composed largely of one tree species or they may have a mix of hardwoods and conifers with a variety of shade tolerant (e.g. sugar maple, beech, and hemlock) and shade intolerant tree species (e.g. black cherry, some oaks, yellow poplar, and birch).

Figure 2. Percentage of forest type groups.



About 536,000 acres (60%) consists of the Northern hardwood forest type group, with various forest types:

- sugar maple-beech-yellow birch
- sugar maple, basswood
- black cherry-white ash-yellow poplar
- red maple (dry site)
- sugar maple
- sugar maple-beech-yellow birch-red spruce
- mixed hardwoods
- quaking aspen
- birch
- bigtooth aspen
- beech

Approximately 282,000 (32%) acres of the MNF is composed of oak forest types:

- oak-white pine
- oak-yellow pine
- chestnut oak
- black oak-scarlet oak-hickory
- white oak
- Northern red oak
- yellow poplar-white oak-Northern red oak
- mixed oak

Approximately 45,000 acres (5%) of the Forest is composed of conifer forest types:

- red pine
- white pine
- white pine-hemlock
- hemlock
- Norway spruce
- red spruce-balsam fir
- tamarack
- white spruce-balsam fir-Norway spruce
- Virginia pine
- pitch pine

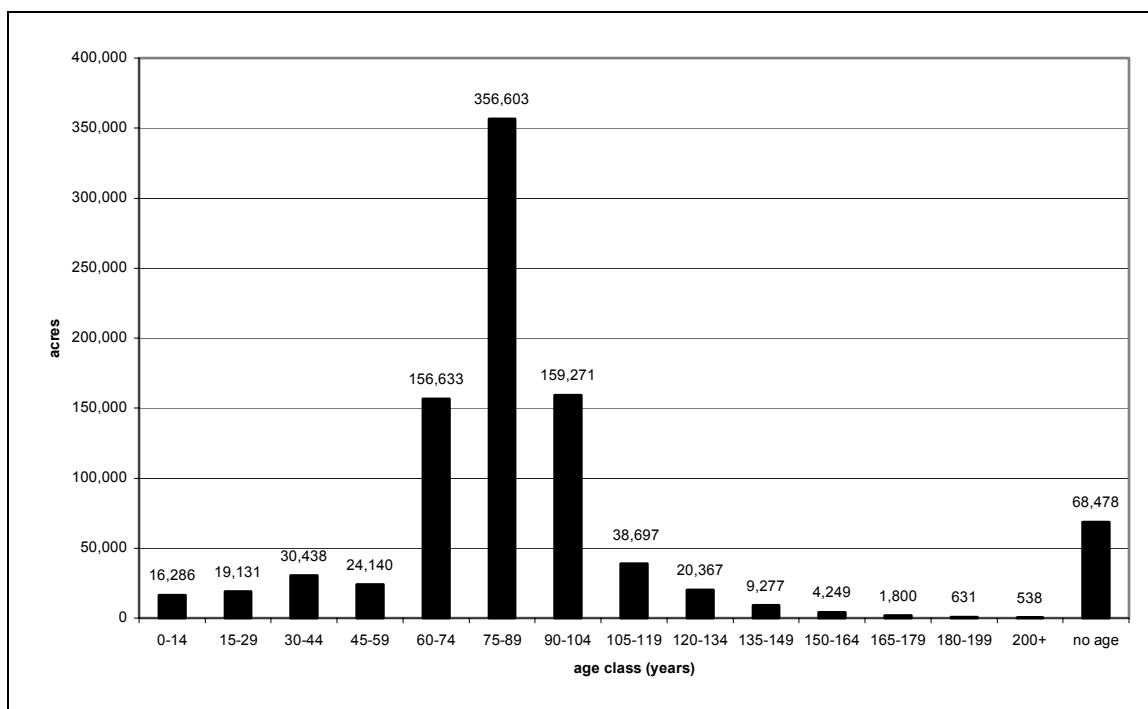
The following minor forest types comprise less than 1% of the Forest (approximately 1,500 acres):

- river birch-sycamore
- red maple (wet site)
- black walnut
- black locust
- ash

Brush or shrub lands comprise about 1% of the Forest (about 9,000 acres) and are classified as either upland or lowland. Open areas with grass, forbs, or other herbaceous ground cover comprise slightly more than 2% of the Forest (about 20,000 acres). These forest types do not include lands in the process of regenerating after a regeneration harvest, however tree species may be filling in some of these open areas.

About 2% of the Forest is comprised of stands of trees less than 15 years of age. Most of the forest is over 60 years old (~81%). About 8% of the forest is over 105 years old. The following figure shows the distribution of acres in 15-year age classes for the Forest.

Figure 3. Age class distribution of the MNF (2002). *Data represents all MPs.



Currently, timber resources are perpetuated via a combination of active management (even-aged and uneven-aged management) and passive management (natural succession). Noncommercial means and

natural events contribute to diversity of forest types and age classes, but they are not considered sufficient alone to provide the scale and scope necessary to meet Forest goals.

METHODOLOGY

Effects are described in quantitative and qualitative terms. Standards for each MP guide management of stand age and species composition (forest type). Therefore, changes the action alternatives would make to MP areas and standards were used to determine impacts on the ability to create age class diversity and manage forest types. Effects were estimated by determining the number of acres proposed for assignment to MPs with standards precluding commercial timber harvests that are currently available and suited to commercial timber management under the implementation of the existing *Forest Plan*. Not every acre designated for Indiana bat management (MP 6.3 or Zoological Areas for Indiana bat) would be considered unavailable for commercial timber harvest. Commercial harvest may occur, but production of commercial timber would not be the focus of these areas.

For the purposes of this analysis, it was assumed that lands currently under MPs 2.0, 3.0, 4.0, and 6.1 are available for commercial timber harvest. At the site level there may be individual stands too steep or with regeneration concerns or other environmental factors that make commercial timber management unsuited to that site; but with this analysis at the programmatic level, these specifics are not necessary. This is consistent with the method followed in the *Forest Plan*. See the Timber Sale Program section for effects to the land base available for commercial timber management.

The role of non-commercial actions (e.g. felling trees to allow light to the forest floor without removing commercial timber products) to manage age class and forest type diversity was also considered. Non-commercial actions would be allowed under all alternatives, but the Proposed Action, Alternative 1, and Alternative 2 would not allow commercial measures in WV northern flying squirrel suitable habitat. Alternative 2 would not allow it in Indiana bat primary range, key areas, and within 2-mile radii of maternity sites.

The forest type of any stand is not likely to change over the short term (0-5 years), other than small areas (<five acres) converted to open, grass covered areas for wildlife habitat. The forest type of a regenerated stand is expected to be the same as the parent stand, in most cases; and only the age and size-density description of the stand would change. Thinning a stand would not usually change the age or forest type.

DIRECT & INDIRECT EFFECTS

No Action

Continued application of the *Forest Plan* would result in changes in forest type and age class diversity as described in the *Revised Biological Assessment* (USFS, 2001). Pages 4-24 through 4-35 of the *Forest Plan FEIS* address the impacts of the current *Forest Plan* on age class distribution. Tree species distribution is also discussed in general in this section.

The *Forest Plan* allowed “occupied” WV northern flying squirrel habitat to be continually designated as Zoological Areas when nest boxes or trapping determined use of an area (*Forest Plan*, p. 234). The ½-mile radius circles shown as “occupied” habitat are not the maximum area suited for the squirrel or the only area it is likely to be found. In general, areas available and suited to active management through commercial timber sales would remain available and managed as described in the *Forest Plan* and *FEIS*. Changes in age class and forest type diversity as predicted in the *Forest Plan* would continue to occur.

Proposed Action

In terms of ability to actively manage the forest for diversity in forest types and age classes, the Proposed Action’s main effects would come from the proposed standards listed on the following pages.

1. **Area description MP 6.3, page 14, Appendix A.** There would be no change in purposes for lands within Indiana bat primary habitat that are currently designated as MP 5.0, 6.2, or 8.0. For these MPs, this alternative would be no different than the No Action Alternative. Natural forces would continue to change the forest types and age class distribution in these areas.
2. **MP 6.3, 1900 #3, page 15, Appendix A.** This standard would prohibit tree felling in Indiana bat primary range from April 1 through November 15, which is the normal operating season for commercial timber harvest contracts. To preclude tree felling on ~156,000 acres during this time would likely lead the MNF to consider offering more commercial timber sales in which timber is yarded by helicopter. Some of the area included in Indiana bat primary range would likely be yarded by helicopter regardless of seasonal restrictions to protect Indiana bats because timber sales operated by helicopter have been and continue to be a tool to mitigate effects to other resources. Increased use of helicopters would not greatly affect the Forest's ability to actively manage for forest type and age class diversity at the programmatic level. However, helicopter logging is more expensive to implement than conventional ground based skidding methods. On some specific sites, management of age class diversity may not occur if it is not economical to implement commercial timber harvest via helicopter yarding (e.g. a regeneration harvest that is economically on the borderline of viability for ground based skidding will not be a feasible choice for yarding by helicopter). On such sites, shade-intolerant tree species could, over time, dominate the stand, potentially replacing shade-intolerant species.

Non-commercial activities involving cutting trees less than 5 inches in diameter (MP 6.3, p. 15, 1900, #1 and #2, Appendix A,) could occur at any time of the year. For example, pre-commercial thinning to favor certain tree species would be allowed. Generally, actions needed to affect forest type or age class management involve at least some trees larger than 5 inches in diameter. This proposed standard would not affect the Forest's ability to achieve age class or forest type diversity or substantially affect age class diversity or forest types of the Forest.

3. **Area description of MP 6.3, page 13; 2410 #1 and #2, page 18; 2470 all, pages 18-21; and 2600 #3, page 21, Appendix A.** In assigning Indiana bat primary range to MP 6.3, areas of forest currently assigned to MP 2.0 and 3.0 would be managed more like MP 6.1 in terms of vegetation management. The largest change in management would occur in areas currently assigned to MP 3.0. Under the Proposed Action, these areas would have limits to the amount of area regenerated per entry, and leave clumps would have to be retained in regeneration harvest areas. Such a change in management emphasis would not affect the Forest's ability to balance age classes since this would still be a goal of lands assigned to Indiana bat primary habitat to provide for suitable habitat over the long term. However, reaching age class distribution goals may be slowed over the long term because (1) the main purpose would no longer be on producing timber; and (2) limits to the percent of area regenerated in any planning cycle would be placed on MP 3.0 lands where such restrictions do not currently apply.
4. **MP 6.3 2600 #3, page 21, Appendix A.** The guideline to have no more than 7.5% of the area in the 0-14 year age class is no different from current *Forest Plan* standards for MP 6.1 areas. In the current *Forest Plan*, the guideline reads that a maximum of ½ a percent per year (of entry cycle) can be regenerated during an entry, up to 8%. With a 15-year entry cycle, creating a 0-14 year age class, this would mean that no more than 7.5% of the area could be regenerated in an entry. MP 3.0 areas have no standards limiting the portion of an area entered for timber practices (thinning and regeneration) during any given entry cycle; however, the goal is for 10-25% (depending on productivity) of the area to be in seedling/sapling sized trees. On the 48,000 acres currently designated as MP 3.0, regeneration would be limited to 7.5% per 15-year entry cycle. This would increase the time it takes to balance age classes, but it would not prevent it.

Currently, in MP 2.0 areas, since even-aged management is not emphasized, there is no limit to the amount of area entered for timber practices during an entry cycle. Proposed standard MP 2300 #3

would have no effect to management in MP 2.0 areas because it is likely uneven-aged management would continue to be applied on any existing MP 2.0 areas that would be reassigned to MP 6.3. Thus, the effects to age class distribution and forest types would be the same in these areas as for the No Action Alternative.

5. **MP 6.3 2470 #3, page 19, Appendix A.** In general, guidelines to retain residual trees at 9 to 16 inches dbh and greater than 16 inches dbh will not be substantially different than current prescriptions; however it is expected that residual basal areas would be higher in regeneration harvests in Indiana bat range as opposed to those in the general forest. However, the guideline recognizes the need for residual basal areas to be low enough for regeneration. This guideline is purposely broad so that as site-specific review of an area is made for management options, the immediate needs of the Indiana bat can be meshed with the desire to regenerate stands for future bat habitat.
6. **MP 6.3 2470 #4b, page 19, Appendix A.** The guideline to leave a component of the largest trees in the stand when designing even-aged regeneration harvest units (shelterwood, two-age, and clearcut) increases the chances for regeneration failure. If residual trees are not removed within five to eight years of the establishment of the new stand, they will likely be too large to remove without major damage to the young stand. If the large trees are left until the next regeneration harvest, the shade they create could reduce regeneration success of shade-intolerant tree species. When large residual trees are retained well into the life of the new stand, girdling many of the residual trees may be necessary to allow succession, but at the same time, this would produce large snags in the young stand. Spacing and numbers of these large trees to leave per acre would need to be closely monitored during unit layout to reduce these risks, but it would not prevent the management of age classes or forest types.
7. **MP 6.3 2600#1, page 21, Appendix A.** In areas designated as MP 6.3, 20% of the area would be maintained for mature habitat or old growth. Stand characteristics can be used to describe old growth including, but not limited to, large standing dead trees, large wood on the ground and multiple vertical vegetative layers. For this analysis, it is assumed these characteristics would be found in the three oldest age classes if areas were managed on a 15-year cycle and a 200-year rotation (MP 6.3 2600 #3, page 21, Appendix A). Depending on tree species composition and physical site characteristics (soil depth and moisture, available nutrients, etc.), different stands would exhibit old growth characteristics and functions at different ages. When age classes are in balance, these three oldest age classes would include about 22% of the forested area. This standard would result in the same outcome as application of other MP 6.3 standards and is similar to current MP 6.1 management (No Action Alternative). MP 6.1 current standards require 5% of the area be in old growth, however with long rotations and limits to regeneration harvest, many acres would continue to age without active management, trending toward mature habitat (No Action Alternative). Current MP 2.0 standards do not require retention of old growth since uneven-aged management generally creates conditions similar to old growth over time. Singletree selection especially would create multi-layered stands with large variety in tree diameters. Current MP 3.0 standards require 5% of the area to be in old growth. While the portion of the area in regeneration is allowed to be greater in MP 3.0 areas, long rotation ages (similar to MP 6.1 and MP 6.3 rotation ages) are prescribed that lead to the same outcome of more than 5% of an area trending toward mature habitat conditions. Implementation of proposed standard 2600 #1 on ~48,000 acres that are currently assigned to MP 3.0 could potentially result in more acres being retained for old growth (0 to 2,400 more acres or up to 0.26% more of the MNF depending on whether timber harvesting is ever implemented on the acres retained as old growth).

If old growth stands need to be older than the rotation age then 20% of the area would be more susceptible to insects and disease. The standard definition of old growth is stands older than normal rotation age. Since MP 6.1 and 6.3 rotation ages are set longer than normal to meet wildlife needs, the definition used here is not substantially different than the broader definition. If past trends are

any indication, it is likely the area regenerated each entry would not be the maximum allowed; it would take many decades for age classes to be in balance. Since older stands are protected from regeneration through a standard requiring regeneration harvests come from stands originating after 1905 until age classes are balanced, older stands would continue to age.

Using NFS land around one Indiana bat hibernacula as an example, Table C shows the 2002 age class distribution and changes in the distribution assuming a 15-year entry cycle. Also assumed is that the maximum amount of regeneration harvest would be done each entry (7 ½%) and those acres would come from the age class with the largest amount of acres.

Table C. Age class distribution, example of regeneration harvests in a MP 6.3 area.

Age class	Acres 2002 %		Acres 2017 %		Acres 2032 %		Acres 2047 %		Acres 2062 %		Acres 2077 %		Acres 2092 %		Acres 2107 %		Acres 2122 %		Acres 2137 %		Acres 2152 %		Acres 2167 %		Acres 2182 %		Acres 2197 %		Acres 2212 %	
0-14	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
15-29	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
30-44	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
45-59	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
60-74	5,482.4	22%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
75-89	11,881.3	49%	5,482.4	22%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
90-104	4,770.6	20%	10,050.7	41%	5,482.4	22%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
105-119	561.8	2%	4,770.6	20%	8,220.1	34%	5,482.4	22%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
120-134	221.8	1%	561.8	2%	4,770.6	20%	6,389.5	26%	5,482.4	22%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
135-149	16.2	0%	221.8	1%	561.8	2%	4,770.6	20%	4,558.9	19%	3,651.8	15%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
150-164	0.0	0%	16.2	0%	221.8	1%	561.8	2%	4,770.6	20%	4,558.9	19%	3,651.8	15%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%	1,830.6	8%
165-179	72.4	0%	0.0	0%	16.2	0%	221.8	1%	561.8	2%	4,770.6	20%	4,558.9	19%	3,651.8	15%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%	1,830.6	8%
180-199	5.1	0%	72.4	0%	0.0	0%	16.2	0%	221.8	1%	561.8	2%	2,940.0	12%	2,728.3	11%	3,651.8	15%	579.3	2%	110.3	0%	8.9	0%	226.0	1%	1,830.6	8%	1,830.6	8%
200+	0.0	0%	5.1	0%	77.5	0%	77.5	0%	93.7	0%	315.5	1%	877.3	4%	3,817.3	16%	4,715.1	19%	6,536.3	27%	5,285.0	22%	3,564.7	15%	1,743.0	7%	138.4	1%	138.4	1%
Total with age	23,936																													
Total	24,408																													
No age (open areas)	472																													
Total over 150 years	78	0%	93.7	0%	315.5	1%	877.3	4%	5,647.9	23%	10,206.8	42%	12,028.0	49%	10,776.8	44%	9,056.5	37%	7,234.8	30%	5,630.2	23%	5,630.2	23%	5,630.2	23%	5,630.2	23%	5,630.2	23%

*Percentages have been rounded to the nearest whole percent. This is an example of regeneration harvests in a MP 6.3 area. It shows the age class distribution for the NFS land within a 5-mile radius of one Indiana bat hibernacula.

In Table C, regeneration harvest comes from the 75-89 year age class in 2002. As trees age, at some point in the future, regeneration harvest may have to come from stands in the older age classes because these would have the most acres. In the example MP 6.3 area, this may occur in 2077 when harvests might be taken from the 165-179 year age class. Regeneration harvest in 2092 might be taken from the 180-199 year age class. Regenerating acres from other, younger, age classes might be possible without reducing acres below the balance point. In this simplified example, acres for regeneration are taken from the age class with the most acres regardless of age class to show the possible effects of implementing proposed MP 6.3 standards.

The proposed guideline reads that no more than 7.5% of the area is to be in the 0-14 year age class at any time (MP 6.3 2600 #3, page 21, Appendix A). If the area is entered for commercial timber sales every 15 years, then the maximum regeneration allowed per entry is 7.5%. If the area is entered on a cycle with a different or irregular length, an accounting for the area in the 0-14 year age class would be made and the difference between the existing acres in the youngest age class and 7.5% of the area would be the maximum regeneration harvest allowed.

The current age class distribution in this example is very similar to the forest overall in that the bulk of the area is 75-89 years old (see table "Age Class Distribution MNF"). Currently in the areas proposed as MP 6.3, less than ½ a percent of the area contains stands older than 150 years. In 2062, 60 years from now, the forest would have aged so that the guideline of a minimum of 20% of the area be in old growth would be met; 23% of the area would be in the three oldest age classes. This percentage would continue to rise through two more cycles, then fall over four cycles to be at 23% again in the year 2152. In the year 2092, regeneration harvests would have to come from these older age classes because the rest of the age classes would be under-represented or are at the target percentage (7.5% for balanced distribution). In the year 2197, 13 cycles or 195 years from now, the age classes would be in balance with 23% of the area in stands 150 year or older and 7.5% (rounded to 8% in the table) of the area in each age class.

8. **MP 6.3 2600 #2, page 21 Appendix A.** As proposed, a minimum of 50% of the MP 6.3 areas should be maintained in pole and sawtimber sized trees with a minimum of 50% crown closure. Currently, most of the forest is over 60 years of age. It can be estimated that crown closure occurs at about age 20 in most hardwood stands (based on observations by foresters and others on the Forest). This 2600 standard would be met as a result of implementing other proposed MP 6.3 standards. The restriction on area in the youngest age class at any given time (7½% in stands age 0-14 years) would limit the amount of area regenerated during an entry cycle, causing much of the area to be retained in pole and saw timber sized stands. Long rotation ages and a limit to the amount of area directly disturbed in each entry would also serve to create the conditions specified by the standard. If lower crown closures are desired, there could be an increase in the acres thinned in these areas. Some stands deemed marginal in terms of economics if the area was not designated as MP 6.3, may be thinned to create conditions favorable to the bat. This affect is the same regardless of current MP designation.
9. **Indiana bat Zoological Areas, 2670 #3, page 34, Appendix A.** Within Indiana bat key areas, a minimum of 150 acres would be designated as old growth and mature habitat or potential old growth and potential mature habitat. Key area designation is proposed for over 2,000 acres of NFS land. Within the key area, little large-scale management is expected, however if changes occur that make the Forest less suitable for Indiana bats, actions may be taken (Zoological, 1900 #2, page 31 and Zoological, 2400 #1, page 32, Appendix A). If no action were taken in the stands, over time these stands would be dominated by shade tolerant tree species (McGee 1986, Abrams, Orwig, and DeMeo, 1995) and become more complex in structure as larger trees die and openings are created in the stand. Over time, there would be diversity in age of trees in the stands rather than a diversity of age classes across all stands in an area. These changes in age, structure, and forest type would occur regardless of current MP designation. Under the No Action Alternative, no key area is designated, but vegetation management is limited within 200 feet of a hibernacula.
10. **WV northern flying squirrel Zoological Areas, 1900 #1 and 2, page 39, Appendix A.** About 58,000 acres of proposed WV northern flying squirrel habitat is currently designated as MP 6.1, 12,000 as MP 3.0, 5,000 as MP 2.0, and 800 as MP 4.0. Currently, these areas are assumed available for commercial timber production; but they would not be available under this alternative because they would be reassigned to WV northern flying squirrel Zoological Areas. No active management to balance age classes and manage forest species composition would occur in these areas unless implemented under a research permit.

Since negative impacts to WV northern flying squirrels are to be avoided because it is an endangered species, stands dominated by red spruce and other tree species favored by the squirrel would likely not be harvested even if these stands remained in MP 2.0, 3.0, 4.0, or 6.1 areas. It is likely that while active management of forested stands for age class diversity through commercial timber management is allowed in MP 2.0, 3.0, 4.0, and 6.1 areas, it is unlikely that areas suitable for WV northern flying squirrel habitat would be managed for commercial timber.

The suitable habitat areas mapped for this analysis were based on stand data to determine percentage of conifer dominance. Under all alternatives, a similar analysis would be done during site-specific analysis of a proposed timber sale, and stands with high percentages of conifer would likely be avoided when designing a timber sale. In this way, the change in MP and associated standards for areas previously designated as MP 2.0, 3.0, 4.0, and 6.1 and associated effects would not be significantly different from the No Action.

Comparisons with currently identified WV northern flying squirrel habitat with that proposed under the Proposed Action show an increase in habitat protected, however this effect is diluted by the fact that the number of acres considered “occupied” habitat under the current *Forest Plan* is expected to increase as more squirrel captures are made (Appendix X-1). Given the definition of habitat used in the *Forest Plan*, it has been predicted that 100,000 acres of the Forest would be considered suitable (not “occupied”) WV northern flying squirrel habitat based on elevation of capture sites and extent of red spruce. Under the No Action Alternative, these 100,000 acres could be buffered by ½ mile based on the methods for defining “occupied” habitat. The mapped suitable habitat proposed in this plan amendment serves, in part, to fill in areas between existing known squirrel locations and remove unsuitable areas from the rigid ½-mile radius circles.

11. **WV northern flying squirrel Zoological Area, 2400 #1, page 41, Appendix A.** Commercial timber outputs would be incidental in WV northern flying squirrel suitable habitat. The direct effect would be to remove approximately 51,000 acres from the land base that is considered suitable and available for commercial timber harvest. Commercial timber harvest has been the main tool for manipulating vegetation on the Forest. Over the long term, if active forest management were not implemented in the Zoological Area, forested stands in WV northern flying squirrel suitable habitat would continue to age and change in structure. In the long term, shade intolerant tree species are likely to decline in number and dominance in any given stand because shade tolerant species would increase in numbers and dominance. Black cherry and red oak are likely to decline in number in any given stand, but not decrease across the Forest. As red spruce increases in dominance, these species would likely be found in greater numbers down slope from sites considered marginal for hardwoods. Intolerant individuals may persist in the overstory, but regeneration of shade intolerant species would be minimal. Forest structure would become more complex as multiple canopy layers would form over time. Wind throw, other storm damage, and mortality from insect or diseases would be the main disturbances in these Zoological Areas, producing generally small-scale changes in the overstory.

About 38,000 acres (3,000 from MP 3.0 and 35,000 from MP 6.1) would be considered Indiana bat primary habitat and suitable habitat for WV northern flying squirrel. On these acres, standards for WV northern flying squirrel would generally apply, meaning minimal to no active management of forest type and age class diversity. Effects would be the same as above.

Other proposed changes would have less impact to the Forest’s ability to actively manage forest type and age class distribution.

12. **MP 6.3 2470 #2, page 19, Appendix A.** The de-emphasis on clearcut harvesting within Indiana bat primary range would not result in large effects to the ability to manage forest types and age classes. Since the mid-1990’s acres of shelterwood and two-age regeneration harvests have been greater than acres clearcut (USFS 1999). Generally, regeneration is similar with any of these even-aged methods if

the overstory is removed after regeneration is established under shelterwood harvest. The guideline to use primarily shelterwood and two-age regeneration harvest methods would be a continuation of a current trend. This proposed standard would have no affect on the Forest's ability to manage age class and forest type diversity of the MNF.

13. **WV northern flying squirrel Zoological Areas, 7770, page 41, Appendix A.** Road construction would not normally occur in suitable WV northern flying squirrel habitat. Site-specific reviews of areas proposed for road construction would determine if their habitat would be affected. Generally, WV northern flying squirrel habitat is not completely contiguous and roads could be placed from existing roads into non-WV northern flying squirrel suitable habitat, except for an estimated 6,000 to 7,000 acres (see Transportation effects). Limits on road construction would limit commercial timber management, the main method used to create age class diversity and perpetuate some forest types. The effect to the Forest's ability to manage age class distributions and forest types could be slightly affected by this standard.
14. **MP 6.3 2600 #1, page 22, Appendix A.** A guideline for MP 6.3 includes maintaining 50% of an area in oak and northern hardwood species in stands >50 years old. This represents the existing condition of most of the Forest and primary range. With 200-year rotation for oaks and mixed hardwoods and limiting regeneration to 7½% of the area per year, these conditions would be met without action.

Alternative 1

The largest difference between the Proposed Action and Alternative 1 is that Alternative 1 would not include timing restrictions on timber felling in primary Indiana bat habitat. This would allow more flexibility for active management of the forest for age class and forest type diversity. Other effects to the Forest's ability to actively manage the Forest and the effects to the MNF's age class diversity and forest types would be the same as described for the Proposed Action.

Alternative 2

Under Alternative 2, non-commercial methods of creating younger age classes (e.g. girdling large areas of trees to create open conditions) would be allowed; however, commercial timber harvests would not be allowed within Indiana bat primary range (Zoological, 2400#1, page 32, Appendix A). The primary range would represent ~156,000 acres of the Forest currently designated as MPs 2.0, 3.0, 6.1, and 7.0. The ~56,000 acres within MP 5.0, 6.2, and other 8.0 designations would not be reassigned.

In Indiana bat Zoological Areas, age classes and forest types would no longer be managed via commercial methods. Forests would continue to age and change with little active human management. Non-commercial vegetation management actions may be taken. It is likely that stands with a mix of shade tolerant and intolerant tree species would be dominated by shade tolerant species in the long term. As the forest ages, small-scale disturbances such as individual tree death, disease and insect deaths, and blow-down would be the disturbance factors influencing tree regeneration and stand age. Over the long term, these areas would become uneven-aged in structure as small openings are regenerated. The forest would be more diverse in age within a given stand than between individual stands.

Other effects would be the same as described for the Proposed Action and Alternative 1.

CUMULATIVE EFFECTS

The current *Forest Plan* recognizes that balancing age classes is a goal of forest management (*Forest Plan* p. 74) but only on lands suitable, available, and capable of even-aged forest management. Some standards proposed by the action alternatives would assign suitable lands previously available for active vegetation management to MPs that are unavailable for active vegetation management or would have very restricted limits on active vegetation management (Zoological Areas for WV northern flying squirrels and Indiana bats). However, given that the *Forest Plan* goal for balancing age classes only applies to lands suitable,

available, and capable of even-aged management, the Forest can still achieve the goal, since areas assigned to MPs with threatened and endangered species habitat as emphasis are not all available for even-aged management.

In many areas where active management would not occur under action alternatives, forest types would slowly change to shade tolerant dominated species, especially in stands with maple or beech in the understory. There would be greater diversity of ages of trees within stands than between stands over time.

Given the low levels of past timber harvest on the MNF (~4,000 acres and 27 MMBF annual average 1987-1999, USFS, 1999) and predicted future harvest (no more than ~6,000 acres, USFS, 2001) relative to the total land base, changes described above as effects of action alternatives would occur across most of the Forest. Since the majority of the Forest would continue to change without active management, specific changes in amounts of a given forest type or age class as a result of the alternatives are difficult to differentiate from the effects of implementing the un-amended parts of the *Forest Plan*. The exception to this would be the cessation of active vegetation management in Indiana bat primary ranges as proposed in Alternative 2, and in WV northern flying squirrel suitable habitat in all action alternatives. No past, present, or reasonably foreseeable future actions on NFS or private lands are known that would contribute to cumulative effects. All alternatives would be compliant with existing laws.

SILVICULTURAL PROGRAM

AFFECTED ENVIRONMENT

MNF vegetation is managed via both even-aged and uneven-aged silvicultural systems and by commercial and non-commercial methods. The even-aged system of silviculture includes regeneration harvesting by clearcuts with residuals, two-aged, shelterwood, and seed tree cuts, and intermediate harvesting by thinning. The uneven-aged silvicultural system includes individual tree selection and group selection methods. In uneven-aged systems, regeneration and thinning occur at the same time. All these tools can be used as part of a commercial timber harvest where forest products are removed and income produced.

Non-commercial silvicultural methods include, but are not limited to, timber stand improvement (TSI) and site preparation. Any silvicultural tool could be implemented through a non-commercial action (e.g. a two-aged stand structure could be created by felling most of the trees and not removing forest products). TSI is generally used to improve tree quality in a stand with the goal of increasing the commercial timber value. TSI could also be done to improve stand conditions to favor certain wildlife species. TSI can be accomplished via various actions such as pre-commercial thinning, herbicide application, prescribed fire, individual tree release, or treatment of vines. Site preparation is the action, or actions, taken before or after a regeneration harvest to create conditions favorable to regenerate desired tree species. Site preparation can include prescribed fire, herbicide application, and clearing unwanted vegetation. These actions may lead to or result from commercial actions; they involve an investment (expense) in the stand, do not produce immediate income, and are considered non-commercial actions.

Forest Goal

Forest management goals numbers IV and VI address the silvicultural program on the Forest. Goal IV includes improving the diversity of plants, animals, and stand conditions, with an emphasis on the habitat needs of black bear, wild turkey and associated species (*Forest Plan*, p. 38). Silvicultural practices can be used to achieve the diversity of stand conditions desired. Goal VI states a desire to manage MNF vegetation, according to sound professional procedures, to provide a sustained yield of timber, benefit other resources, and support the local economy with concern for environmental protection and cost efficiency. Both even-aged and uneven-aged silvicultural systems and all harvest

methods are to be used on the Forest. Long rotation ages will normally be used to achieve large tree sizes. Conifers will be managed in mixed hardwood stands where possible (*Forest Plan*, p. 38).

Projected Outputs

The *Forest Plan* predicted that on an annual average for the first decade of implementing the *Forest Plan*, ~2,000 acres would be regenerated (p. 44)(see “Forest Type and Age Class Diversity” section). Of that, ~1,600 acres were predicted to be regenerated by clearcutting, ~160 acres by the shelterwood method, and ~350 acres by the singletree selection (uneven-aged) method. The *Forest Plan* predicted that ~4,000 acres per year between 1986 and 1995 would be thinned commercially. TSI was predicted to occur on ~1,200 acres per year on average during this same time. For various reasons the Forest has not been harvesting at predicted levels (see USFS, *Timber Monitoring, Fiscal Year 2001*).

The even-aged system is the primary silvicultural system used on lands assigned to MPs 3.0, 4.0, and 6.1. About 1,000 acres per year have been harvested by even-aged regeneration methods over the past 12 years. Clearcutting with residuals (snags, cull trees, den trees, and in MP 6.1 additional leave clumps of trees) accounted for ~86% of the total or ~1,000 acres per year. However, the MNF reduced its use of clearcutting as a management tool in the early 1990s, and acres regenerated by clearcutting has decreased every year since 1993 (USFS, 2001, *Revised Biological Assessment*, p. 13).

Two-aged regeneration harvesting was proposed as an alternative to clearcutting in the early 1990s to mitigate visual and wildlife concerns. Two-aged harvests are considered an even-aged system of regeneration. Typical two-age harvest prescriptions call for leaving 20-50 good quality, 9-inch diameter or larger trees per acre while harvesting almost all other commercial trees. Use of shelterwood and seed tree regeneration harvests has also increased as alternatives to clearcutting. Culls, snags, and den or cavity trees, like those left in clearcut units, also are retained in all other even-aged regeneration harvests. Alternative harvest areas also are site-prepared by cutting the smaller, noncommercial stems (1 to 5 inches in diameter) except for selected desirable small stems with wildlife or visual values and the leave trees. Preliminary reports suggest that desirable regeneration becomes established and can compete with other plant or trees species under a two-aged harvest.

From 1987 to 1998 the average annual combination of two-aged, shelterwood, and seed tree harvests totaled about ~170 acres (14% of all even-aged regeneration). From 1995 to 1998 the average annual harvests by these methods increased to ~360 acres or about 52% of the total even-aged harvest during that time period (USFS, 2001, p.13).

Thinning is an intermediate harvest under the even-aged silvicultural system and is designed to increase the growth and value of the residual stand before an eventual regeneration harvest. Annually the Forest thins an average of ~3,000 acres (USFS, 2001, p. 14).

The uneven-aged silvicultural system is emphasized under MP 2.0, but it is also allowed under other MPs. Both singletree selection and group selection are uneven-aged methods allowed under the *Forest Plan* for any MP allowing timber harvest. Annually, the MNF has used singletree selection on an average of ~240 acres (USFS, 2001, p. 14). Group selection has been used to a limited degree.

On average, ~900 acres per year receive TSI treatment. Pre-commercial thinning, one type of TSI, generally occurs in stands less than 25 years of age. Severing grape and or camphor vines to reduce breakage, damage, or death of quality trees is another common TSI treatment. Another type of TSI is release of individual trees by herbicide to reduce competition from undesirable species. Herbicide TSI has averaged ~100 acres per year (USFS, 2001, p.14).

METHODOLOGY

The effects on the diversity of plants and stand conditions (Forest Goal IV) was determined by qualitatively describing the MNF’s ability to use the silvicultural tools listed in the Affected Environment

section. The effects to the Forest's ability to manage the Forest by sound, professional procedures (Forest Goal VI) are qualitatively described. Since most silvicultural actions taken, and tools used, on the MNF are implemented through a commercial timber harvest or are a result of timber harvest (planting, individual tree release in young stands), effects to the Forest's ability to manage for commercial timber products also apply to the silvicultural program (see Timber Sale Program effects).

DIRECT & INDIRECT EFFECTS

No Action

The No Action Alternative would not affect the Forest's ability to achieve goals IV and VI. There would be no change in the Forest's ability to use the silvicultural tools listed in the Affected Environment. Both even-aged and uneven-aged silvicultural systems could be used where active vegetation management is allowed. The MNF would likely continue to decrease the amount of area regenerated by clearcutting, and increase in other regeneration harvest methods as were described in the Affected Environment section.

Proposed Action

The Proposed Action would not noticeably affect the Forest's ability to achieve goals IV and VI. The Proposed standards would not preclude the use of any silvicultural tool.

Proposed changes include a guideline to limit use of pesticides in Indiana bat habitat (MP 6.3 and Zoological standards) (MP 6.3 2150, page 16, and Zoological standard, 2150, page 32, Appendix A). Under the No Action, pesticide use was to be avoided within 200 feet of an Indiana bat hibernacula. Under the Proposed Action, the guideline would be changed to cover the area within five-mile radii of the cave and to limit instead of avoid use. This change does not entirely preclude use of herbicide for site-preparation during even-aged regeneration harvest, however close cooperation with wildlife biologists would be needed on herbicide use proposed in these areas. If herbicide is not allowed, other silvicultural methods may need to be used to prevent oak species from losing dominance in some regeneration harvests.

Proposed Indiana bat MP 6.3 areas include standards for timber regulation and silvicultural systems (MP 6.3 2410 and 2470 page 17-21, Appendix A). These are largely taken from existing MP 6.1 standards with additions to meet Indiana bat habitat needs. The biggest change comes from applying these standards on 48,000 acres that were 3.0. There would be no real change in management and expected outputs from those areas designated as MP 6.3 that were MP 6.1 since the standards are very similar. No real change would result on the 1,000 acres that are currently designated as MP 2.0 because uneven-aged management is compatible with Indiana bat habitat requirements and it is likely that uneven-aged management would continue on those acres as appropriate.

Under the Proposed Action, shelterwood and two-age regeneration harvests would be preferred in Indiana bat primary range (MP 6.3 2470 #2, page 19, Appendix A). This would not represent a great change in the silvicultural program as the Forest has steadily reduced the acres regenerated by clearcutting over the last decade and the new guidelines would allow for clearcutting if site-specific analysis warrants use.

Although they are not in addition to the leave trees already required in shelterwood and two-age harvest units, the guideline to leave some of the largest trees in a stand when designing even-aged regeneration units (shelterwood, two-age, clearcuts) per guideline MP 6.3 2470 #4 page 19 Appendix A, could increase the chances for regeneration failure. Generally, large trees (greater than 16" dbh) are not left as residuals in shelterwood or two-aged harvest units because they quickly become too large to remove without excessively damaging young trees. If these larger trees are not removed (or girdled) within 5 to 8 years, their crowns become excessive and retard development of the young stand. Since the residual basal areas will be higher in regeneration harvesting Indiana bat ranges as opposed to those in the general forest (MP 6.3, 2470, #3 and 4b, page 19, Appendix A), there is greater risk for regeneration failure, which could affect the Forest's ability to meet goals IV and VI. However, the guideline recognizes the necessity of

residual basal area being low enough to permit successful regeneration; and attention to the size and spacing of leave trees during unit layout would reduce the risk of regeneration failure.

An added guideline states that thinning from below would be the preferred thinning or improvement method for the oldest stands (originating before 1905) in Indiana bat primary range (MP 6.3 2470 #7, page 21, Appendix A). While this is an accepted silvicultural practice, if not implemented correctly this action could have little effect on the diameter growth of the residual stand. Because this restriction applies only to the oldest stands, the impact is not expected to be significant, especially in the short term. Also, if timber harvest is limited to helicopter yarding due to seasonal restrictions on cutting trees (see the Soil and Water effects report), this treatment may not be possible due to economic factors and opening size needed to safely yard by helicopter. If helicopter yarding is required as mitigation for timber harvesting during wetter months of the year (as a result of seasonal restrictions), it is likely that opportunities to thin some areas may be lost. Some areas may not be operable due to economics or the need for open space to safely yard by helicopter.

Vegetation management in WV northern flying squirrel habitat would be limited to only those actions to improve or enhance squirrel habitat or for public safety (Zoological Area 832 1900#1, page 39, Appendix A). Active management, commercial or non-commercial, would require a research permit under the Endangered Species Act. The effects description for forest type and age class diversity discusses consequences of excluding even-aged management in these areas. However, as discussed in effects to forest type and age class diversity, the mapped WV northern flying squirrel habitat would be checked for accuracy on the ground as site specific projects are proposed. Also, much of the area mapped would likely be withdrawn from active management as more WV northern flying squirrels are captured (under the No Action). As this habitat is considered not available for timber management, silvicultural actions would be limited, but all tools would be available if needed to improve or enhance WV northern flying squirrel habitat.

Alternative 1

Effects would largely be the same as described for the Proposed Action. However, there would be no seasonal restrictions so there would be more flexibility in silvicultural treatments and less area would be affected by constraints on active timber management than the Proposed Action. Standards for Indiana bat key areas (2,500 acres) and WV northern flying squirrel suitable habitat would have the greatest restriction on timber or vegetation management.

Alternative 2

Effects are largely the same as in the Proposed Action and Alternative 1 with one addition. Alternative 2 proposes to exclude timber management in the primary range, key areas, and area within two-mile radii of a maternity colony of Indiana bat; this would exclude commercial silvicultural tools (Indiana bat Zoological standard, 2400 #1, page 32, Appendix A). Non-commercial silvicultural actions may still be implemented if compatible with Indiana bat habitat needs. The effects description for Forest Type and Age Class Diversity discusses the consequences of excluding even-aged management in these areas.

CUMULATIVE EFFECTS

Under any alternative, sound silvicultural practices would continue to be implemented on the Forest for various outcomes. None of the alternatives would noticeably affect the Forest's ability to achieve goals IV and VI or achieve projected outputs. They would not have substantial direct/indirect effects that would contribute to effects of past, present, or reasonably foreseeable future actions on NFS or private lands. All alternatives would be compliant with pertinent laws.

FOREST HEALTH

AFFECTED ENVIRONMENT

Forest health can be defined in many ways. In general, a healthy forest is one that recovers from impacts such as storm damage, fire, insects, disease, drought, etc., while providing necessary habitat for desired wildlife. A healthy forest also responds to silvicultural treatments as expected; for example, a regeneration harvest leads to regeneration of expected tree species. Known forest health issues on the MNF were addressed to evaluate what portion of NFS land currently relegated to active vegetation management for timber and wildlife purposes (MP 2.0, 3.0, 4.0, and 6.1 areas) would no longer be available for active vegetation management because of changes to Indiana bat and WV northern flying squirrel standards.

Forest Goal & Projected Outputs

Goal XVI in the *Forest Plan* (page 40) speaks to the protection of natural resources from insect and disease. No outputs associated with forest health were estimated in the *Forest Plan*.

Known forest health issues on the MNF include: gypsy moth defoliation, red spruce decline, beech bark disease, presence of hemlock wooly adelgid, and invasive plant species. Forest health issues are managed via active vegetation management (e.g. thinning) and application of pesticides. Passive management (natural succession), a conscious choice for much of the Forest, is also used.

To reduce gypsy moth populations, *B.t.* and Dimilin have been sprayed in recent years. To address red spruce decline, red spruce is being allowed to succeed and replace hardwoods, and the causes and impacts of red spruce decline are under study by the Northeast Forest Experiment Station. Beech bark disease is common on the MNF and some herbicide treatment has been proposed to reduce sprouting after beech bark disease. The MNF is working in cooperation with State and Private Forestry on biocontrol release to reduce hemlock wooly adelgid impacts. The Forest is surveying for invasive species and working to remove invasive plants from range allotments.

METHODOLOGY

Changes in the Forest's ability to manage known forest health issues and actively protect vegetative resources from degradation are qualitatively described.

DIRECT & INDIRECT EFFECTS

No Action

The No Action Alternative would not affect the Forest's ability to (1) actively manage known forest health issues and (2) prevent vegetative resources from degradation (see Affected Environment).

Proposed Action

Proposed standards would not noticeably affect the health of the Forest or substantially change the Forest's ability to address forest health issues. Few proposed standards have the potential to affect the management of forest health on the MNF. The following pages describe the proposed standards that could affect forest health and the extent of the effect.

A VA big-eared bat standard is proposed that would restrict vegetation management within 200 feet of VA big-eared bat caves except to improve VA big-eared bat habitat or for public safety (Appendix A, p. 23, 1900 Vegetation). This standard would not affect the MNF's ability to manage forest health issues because (1) it is not significantly different from existing VA big-eared bat direction (*Forest Plan*, pp. 230-231), and (2) the area within 200 feet of VA big-eared bat hibernacula represents < ~0.005% (~40 acres) of the MNF. Also, the proposed standard would allow action to be taken to address forest health issues if a site-specific analysis indicated it would improve habitat for the bat (e.g. a stand could be thinned to reduce susceptibility to beech bark disease or gypsy moth defoliation if it would improve bat habitat).

Proposed standards to limit the use of pesticides in Indiana bat primary range and key areas are not likely to affect forest health management (Appendix A, p. 16, MP 6.3, 2150 and p. 24, Zoological Area, 2150). Under the No Action, pesticide use is avoided within 200 feet of Indiana bat hibernacula, within at least 200 feet of a maternity colony, and within a 330-foot wide forested travel corridor (*Forest Plan*, 231). Under the Proposed Action, the area where pesticide use would be limited would increase to five-mile radii of Indiana bat hibernacula. Pesticide use would not be encouraged in these areas, but could be allowed if needed to limit gypsy moth populations or hemlock wooly adelgid and a site-specific analysis determined applications would not adversely affect endangered bats.

A proposed vegetation standard for Indiana bat primary range would promote long rotation ages for tree harvesting, just as existing MP 6.1 standards do (Appendix A, p. 18, MP 6.3, 2410 #1). As under the No Action Alternative, older trees will be more susceptible to disease and insects, such as death from repeated defoliation by gypsy moths. The effects of the Proposed Action would not be different than the No Action Alternative given the long rotation ages maintained across the MNF (up to 200 years depending on the species) and the low percentage (< 0.5% to 0.7%) of the Forest that is regenerated each year. Much of the MNF will continue to age and change without active management.

Seasonal restrictions on tree cutting are proposed in Indiana bat primary range, key areas, and within 2-mile radii of maternity colonies (Appendix A, p. 15, MP 6.3, 1900, #3 and p. 32, Zoological Area, 1900, #4). Such restrictions may prevent some silvicultural options from being implemented within five-mile radii of Indiana bat hibernacula; this is because soils may not be able to withstand conventional logging activities in the winter, and helicopter logging may not be economically feasible (see Soil and Water effects and Timber Sale Program effects later in this chapter). However, forest health would not necessarily be adversely affected; other silvicultural tools may be used instead. For example, commercial thinning to reduce susceptibility of a stand to damage from gypsy moth or beech bark disease may not be economically feasible if helicopter yarding is the only option to mitigate winter logging's effects to soil and water resources (see Soil and Water effects). In such cases, a regeneration harvest may have to be used instead of a thinning so the treatment would be economically feasible; or noncommercial methods may have to be used. Silvicultural tools (such as non-commercial methods) that are not cost efficient can be used, but Forest Goal VI stresses that local economies and cost efficiency of methods be considered in management of the Forest.

Indiana bat key areas would be managed as mature habitat and future old growth to provide diversity of habitat (Appendix A, p. 29, Zoological Area, 1900, #2 (a) and p. 34, Zoological Area, 2670, #3a). As previously mentioned, older trees are more susceptible to insects and disease; but this proposed guideline is not a significant change from management under the No Action. Under the No Action Alternative, mature habitat would have been designated on 5% of the area even if Indiana bat key areas were not designated (see *Forest Plan* 1900 Vegetation standards for MP 3.0 and 6.1 on pages 129 and 166).

In areas proposed for designation as MP 6.3, a minimum of 20% of the area would be managed to provide mature habitat or old growth (Appendix A, p. 21, 2600, #1). Stand characteristics used to describe old growth include, but are not limited to, large standing dead trees, large wood on the ground, and multiple vertical vegetative layers. It is assumed these characteristics would be found in the three oldest age classes if areas were managed on a 15-year cycle and a 200-year rotation as proposed in Appendix A (see p. 18, 2410, #1 and p. 21, MP 6.3, 2600, #3). Depending on tree species composition and physical site characteristics (soil depth and moisture, available nutrients, etc.), different stands would exhibit old growth characteristics and functions at different ages. When age classes are in balance, the three oldest age classes would be expected to make up about 22% of the forested area. Thus, the proposed mature habitat standard is consistent with the outcome of application of other standards and is similar to existing MP 6.1 management. If old growth stands need to be older than the rotation age, then 20% of the area would be more susceptible to insects and disease. As under the No Action, the Proposed Action is not likely to regenerate the maximum 7.5% each entry. It would take many decades for age classes to be in balance. Older stands would be protected from regeneration via a standard requiring regeneration harvests to come from stands originating

after 1905 (Appendix A, p. 20, MP 6.3, 2470, #6), thus, older stands would continue to age. As the Forest ages, regeneration harvest may be implemented from older age classes because the bulk of the acres would be in those age classes.

Standards are proposed that would limit vegetation management within Indiana bat habitat (MP 6.3 2400 series standards in Appendix A, p. 17-21 and Zoological Area 1900 and 2400 standards on p. 31-32). If commercial timber harvests were deemed appropriate for reducing impacts from insects and disease, then the effects of this alternative described for the commercial timber program, silviculture program, and age class/forest type diversity discussions would apply here as well. In areas where commercial timber management would be precluded, the Forest's ability to manage forest health concerns may be impacted and forest health may be somewhat adversely affected (e.g. release of red spruce via commercial thinning to increase growth and vigor may not occur in some MPs).

Standards for WV northern flying squirrels are proposed that would increase the area protected and managed for squirrels (Appendix A, p. 11, Forest-wide, #13 (g) (1) and p. 39, Zoological Area, 1950, #1). Other standards are proposed that would prevent vegetation and timber management within squirrel habitat unless it would improve or enhance the squirrel's habitat or for public safety (Appendix A, p. 39, Zoological Area, 1900, #1 and p. 41, Zoological Area, 2400). These changes could result in forest health issues being left untreated on ~76,000 acres instead of ~59,000 acres -- as is the existing condition. Habitat suitable for the WV northern flying squirrels consists mainly of high elevation red spruce and red spruce-hardwoods forest types. Since red spruce decline likely involves larger scale issues such as air pollution and subsequent soil chemistry changes, proposed changes in standards are not likely to affect the MNF's ability to address red spruce decline or substantially affect the health of red spruce. Actions like thinning to increase growing space to healthiest red spruce trees may be needed, and could be accomplished under a research permit in suitable habitat (Appendix A, p. 39, Zoological Area, 1900, #1 (a)).

Alternative 1

Standards proposed under Alternative 1 would not noticeably affect the health of the Forest or the Forest's ability to address forest health issues. Alternative 1 would have essentially the same effects as the Proposed Action except there would be no seasonal restrictions on cutting trees in Indiana bat habitat. Thus, there would be more flexibility under Alternative 1 for managing beech bark disease and stands susceptible to gypsy moth damage because thinning could more easily be used, if appropriate.

Alternative 2

Standards proposed under Alternative 2 would not noticeably affect the health of the Forest or the Forest's ability to address forest health issues. Effects described for the Proposed Action and Alternative 1 apply to Alternative 2, except that in Alternative 2, commercial timber management would not be allowed in the primary range, key areas, or within two-mile radii of maternity colonies of the Indiana bat (Appendix A, p. 32, Zoological Area, 2400, #1). This would preclude commercial silvicultural treatments for addressing some forest health issues, such as thinning to reduce susceptibility to gypsy moth damage. Non-commercial methods could still be used, but they would be required often and at scales that may not be economically feasible.

The standard proposing no commercial timber harvests in Indiana bat primary range, key areas, and within two-mile radii of maternity colonies, would not allow salvage or sanitation harvest on ~158,000 acres if the Forest had an insect or disease outbreak where these treatments were warranted (Appendix A, p. 32, 2400, #1). However, non-commercial methods could still be implemented (Appendix A, p. 31, 1900). If forest health conditions worsen to the point where Indiana bat habitat would be in jeopardy, action could be taken if site-specific analysis showed that the action would benefit the species.

CUMULATIVE EFFECTS

None of the alternatives would have a substantial cumulative effect on the Forest's health or the MNF's ability to address forest health issues. Neither the No Action Alternative, Proposed Action, nor Alternative 1 would result in substantial direct or indirect effects that would contribute to past, present, or future management of forest health issues. Alternative 2 would indirectly affect management of forest health because commercial timber harvests could not be used within five-mile radii of Indiana bat hibernacula (~158,000 acres). However, the cumulative effects of such limitations are not expected to be substantial because if forest health declined to the point that Indiana bat habitat would be adversely affected, non-commercial methods could be used on MNF lands to reduce an area's susceptibility to damage from insects or diseases.

The Forest health issues that occur on NFS land (in the past, present, and future) could, and likely do, occur on private lands. However, none of the alternatives are expected to affect forest health on private lands.

It is likely that additional concerns for forest health will be identified in the future. Because proposed threatened and endangered species' standards would retain flexibility for management, forest health concerns could be addressed over time. All alternatives would be compliant with existing laws.

PRESCRIBED FIRE

AFFECTED ENVIRONMENT

Prescribed burning on the Forest has generally involved burning only a few grass or herbaceous dominated openings for wildlife habitat improvement. Approximately one-third of the Forest is typed as an oak or oak-hickory forest type that could be managed with some level of prescribed fire. Current research and historic records at a regional scale suggest that the oak-hickory forest types are fire dependent or adapted (Abrams 1992, Rouse 1986, Van Lear 1993). Oak regeneration hampered by red or striped maple regeneration in the understory could be given a competitive advantage by prescribed fire timed with release by commercial harvest (Brose, Van Lear, and Keyser 1999). On the Forest are stands of table mountain pine and pitch pine that could benefit from fire as a regeneration tool.

Forest Goal & Projected Output

Prescribed fire is not specifically mentioned in the *Forest Plan* goals, but could be considered part of Goal VI, which directs MNF vegetation management to be based on sound, professional procedures (p. 38). The MNF's 1999 *Monitoring and Evaluation Report* indicated an average of 56 acres/year were burned between 1994 and 1999 (USFS, 1999, p. 23), but no outputs were projected in the *Forest Plan* for prescribed fire. Based on the discussion above, the Forest expects to increase use of prescribed fire to manage oak forest types.

Standards for MPs 2.0, 3.0, 4.0, 6.1, and 8.0 allow for prescribed fire as a tool to establish or maintain vegetation. In MP 1.1 and 7.0, prescribed fire is allowed only for management of fuel levels (hazardous fuel build-up). Prescribed fire is not allowed in MP 5.0 or 6.2.

The goal of most prescribed fires on the MNF is to maintain openings or reduce the understory in forested stands. Therefore, most prescribed fires are ground fires of low to moderate intensity. On the MNF, prescribed fires, and usually wild fires as well, do not reach the crowns of trees or cause large-scale death of hardwood trees over 12 inches in dbh. Conifers are more susceptible to injury and death from fire. Rhododendron and laurel can burn hotter and carry fire through the crown of the shrub layer.

Currently, caves with known Indiana or VA big-eared bat populations are considered smoke sensitive areas when designing a burn plan for a site. Burn plans must be completed and approved before any prescribed fire is initiated. Anticipated effects of proposed prescribed fire are disclosed via the NEPA process.

METHODOLOGY

Changes in the Forest's ability to use prescribed fire as a vegetation management tool are qualitatively described. Few proposed standards would affect the ability to use prescribed fire as a management tool.

DIRECT & INDIRECT EFFECTS

No Action

The No Action Alternative would not change the Forest's ability to use prescribed fire as a management tool. The Forest would continue to use prescribed fire where site-specific analysis showed benefits and no significant effects to other resources.

Proposed Action, Alternative 1, Alternative 2

None of these alternatives would affect the Forest's prescribed fire program. Few proposed standards would have the potential to affect the Forest's ability to use prescribed fire as a management tool.

The Indiana bat zoological standard that calls for the suppression of wild fires near Indiana bat hibernacula would be moved to the MP 6.3 section (MP 6.3 5100#1, page 22, Appendix A). This standard would continue to give high priority to controlling forest fires to prevent bat asphyxiation or significant changes to vegetative cover, but by moving it to the MP 6.3 section, it would expand the area of suppression from 200 feet five-mile radii from Indiana bat caves. Generally, the Forest controls all wild fires in all MPs while ensuring firefighter and public safety; so, this guideline is not different than what is typically implemented under the No Action Alternative. The standard requiring a burn plan and consideration of Indiana bat habitat as a smoke sensitive area addresses prescribed fire and its effects to Indiana bats.

A guideline is proposed that states a burn plan will be developed to insure adverse effects to Indiana and VA big-eared bats are avoided (Forest-wide #14 (b) (4), page 6, Appendix A, Zoological standard 5100 #2, page 36, Appendix A). As under the No Action (current management), all prescribed fires include documentation under NEPA (EA and decision notice or decision memo for categorically excluded actions) and a burn plan for implementation. A biological evaluation of effects to threatened, endangered, and sensitive species is completed as part of the NEPA process. Caves occupied by threatened or endangered species would be noted as smoke sensitive areas in a burn plan and considered in the conditions under which the burn could take place (wind direction that could carry smoke to a cave would be an unacceptable burn condition).

New guidelines would require the amount of smoke created in or near Indiana bat primary range be minimized (MP 6.3 5100 #2, page 22, Appendix A, Zoological standard 5100, page 36, Appendix A). This does not mean prescribed fires cannot take place within the primary range, only that the amount and duration of smoke generated by prescribed fires must be minimized and the dispersion of smoke from these areas must be maximized. The burn window on the Forest is usually narrow, however the parameters needed for minimizing smoke exposure to bats also generally are those favored for a successful burn anywhere on the Forest. The prescribed fire program, expected in the future to average 300 acres a year, is covered by the Forest's incidental take permit for the Indiana bat.

Proposed guidelines for WV northern flying squirrels habitat would allow vegetation management only to improve or enhance WV northern flying squirrels habitat or for public safety (Zoological Area 832 1900 #1, page 39, Appendix A). This would restrict the use of prescribed fire, however it is not likely to affect the Forest's prescribed fire program since WV northern flying squirrels habitat generally is not suited for

management with prescribed fire. Red spruce is a major component of this habitat and is usually harmed by fire; therefore, it is not likely that management by prescribed fire would be considered in this habitat.

CUMULATIVE EFFECTS

Given past, present, and reasonably foreseeable future fire activities on the MNF and private lands, none of the alternatives are expected to result in adverse cumulative effects. Extensive wild fires have not occurred on MNF or private lands since the post-logging era in the early 1900's. Prescribed fire also has not been a widespread practice on private or MNF lands. In the recent past, the MNF has burned less than 300 acres per year. The *Revised Biological Opinion* and associated take permit were developed on the premise that prescribed burns would not be implemented on more than 300 acres per year. If the Forest desires to increase the prescribed fire program in the future to improve regeneration of oak forest types, consultation with the USFWS would have to be re-initiated. If methods such as prescribed fire are not used in the future to reduce understory competition, opportunities to successfully regenerate oaks may be lost. However, it is the "burning window" (days that are within prescribed range of conditions for safe and effective prescribed fire, which varies greatly from year to year) that is the largest restriction on acres that can be burned per year, not standards given in the *Forest Plan*. Proposed changes would be compliant with laws applicable to the use of prescribed fire.

AIR QUALITY

AFFECTED ENVIRONMENT

MNF air quality conditions are generally good (*Forest Plan FEIS*, p. 3-15). MNF management activities like prescribed burning contribute very little toward air pollution because so few acres are treated each year. However, visibility has been reduced due largely to particulate matter in the air formed from the emissions of fossil fuel-fired power plants that generate electricity (USFS, 2000. Fiscal Year 2000 *Monitoring and Evaluation Report for MNF*). High elevation vegetation and water sources show signs of being adversely affected by acid deposition.

Forest Goal & Projected Outputs

"Protect natural...resources of the forest...from damage or degradation" (*Forest Plan*, p. 40). The *Forest Plan* did not identify outputs for air quality management.

DIRECT, INDIRECT & CUMULATIVE EFFECTS OF ALL ALTERNATIVES

None of the alternatives would affect the Forest's ability to achieve the Forest goal for air quality (*Forest Plan*, p. 40). Proposed standards are not expected to adversely affect air quality resources or the management of such resources; therefore, they would not contribute cumulatively to the effects of past, present, or reasonably foreseeable future actions on NFS or private lands. All proposed standards would be compliant with laws governing air quality resources.

SOIL & WATER

AFFECTED ENVIRONMENT

The affected environment for soil and water is described on pages 3-2 to 3-3 and 3-14 to 3-15, respectively, of the *Forest Plan's FEIS*. Additional affected environment information for water is described in the Riparian and Aquatic Resources effects.

Nearly 3,000 miles of perennial and intermittent streams exist on the MNF, many of which are the headwaters of major river systems -- the Potomac, Monongahela, and New Rivers -- that originate from

within the MNF. Most of the Forest's streams are small, high to moderate gradient headwater streams providing cold, clean water to the Cheat, Greenbrier, Gauley, Tygart Valley, and a branch of the Potomac, which feed the major river systems. Precipitation varies across the Forest from a low of about 30 inches to a high of over 60 inches annually (*Forest Plan FEIS*, p. 3-1). Generally, precipitation is well distributed throughout the year and occurs in the higher elevations on an average of 240 days per year. The average annual temperature is 44 degrees Fahrenheit, ranging from 72 degrees in July to 14 degrees in January.

Forest Goal

Forest goals for watershed protection include protecting soil and water resources from damage or degradation (*Forest Plan* p. 40) by complying with applicable provisions of the Clean Water Act, and minimizing point and non-point pollution to the maximum extent technically and economically feasible (*Forest Plan*, forest-wide general direction, p. 79), and implementing soil and water improvements (*Forest Plan*, p. 41).

Except for streams impaired by acid rain, surface waters flowing from NFS land in many cases meet State and Federal water quality standards (*Forest Plan FEIS*, p. 3-14), (personal conversation, Barry Edgerton, Forest Hydrologist on State list of 303d, acid impaired streams). As such, many of the Forest's streams are waters of special concern containing water quality that meets state and Federal standards or are capable of supporting wild or native trout (WVDEP, 6/11/02).

Soil is an important component of maintaining healthy ecosystems and the plants and animals that inhabit them. The soils on the MNF were formed in residual, colluvial, and alluvial materials that were derived primarily from shales, sandstones, siltstones, limestones, and conglomerates. This sedimentary parent material was deposited between the Ordovician and Pennsylvanian geologic periods (about 500 to 250 million years ago). Soils formed on the western portion of the Forest, within the Allegheny Plateau physiographic province, are characterized by high moisture content, thick humus, acidic conditions, and low nutrient levels. Available soil moisture in these soils contributes to high timber productivity (*Forest Plan FEIS*, p. 3-2). Soils formed in the eastern portion of the Forest, in the Ridge and Valley physiographic province, are often shallow, shaley, droughty, and not highly productive (*Forest Plan FEIS*, p. 3-3). A transitional zone of varying soil productivity due to elevation, rainfall variation, and underlying geology occurs between the west and east areas of the Forest (Demeo, et. al. September 1998). Most of the Forest soils exhibit low to moderate erosion potential (project file, sensitive soils map and tables), although high erosion potential areas exist in areas of shale and limestone (*Forest Plan FEIS*, p. 3-3), particularly soils derived from the Mauch Chunk rocks of the Mississippian geologic period (*Forest Plan FEIS*, p. 3-14) and various rock units composed of primarily limestone and calcareous shales.

Soil erosion is a natural process; however, soil disturbance or earth moving accelerates soil erosion. The characteristics of the soil type result in some soils having greater tendencies to erode than others. In general, soils disturbed by heavy equipment when they are wet are at greater risk for compaction and erosion. In addition, soils with low shear strength are at greater risk for erosion, compaction, and slippage if disturbed when wet. Overall, disturbed soils have a higher risk for erosion during periods of water run-off, and a greater potential for slippage when saturated. On the MNF, wet soil and water run-off conditions are most common and generally expected during the winter through spring (about mid-November or December through April or mid-May, depending on location) when evapotranspiration is reduced because vegetation is dormant and daylight hours are relatively short. Also, experience has revealed that frozen soil conditions do not persist for the duration of the winter in many areas of the Forest, and repeated freeze-thaw cycles can exacerbate impacts of heavy equipment use during this wet period. Slope also plays a large role in potential for soils to erode and slip, and for potential for sediment delivery to streams.

Sediment transported from eroding areas or areas of disturbed ground can reach streams and degrade water quality and, ultimately, aquatic habitat (Riparian and Aquatic Resources effects). Sediment that reaches

streams can accumulate in channels and remain for years to decades, depending on a number of different factors, including the stream's gradient (NCASI, 1999).

The risk for soil erosion and compaction with potential for sediment delivery to streams exists whenever earth disturbance occurs. The *Forest Plan FEIS* recognized the potential for these effects (*Forest Plan FEIS*, p. 4-6 to 4-7, p. 4-13), and specified standards in the *Forest Plan*, especially Appendices R (Riparian Area Management, *Forest Plan*, p. R-1 through R-8) and S (Soil Management Handbook, *Forest Plan*, p. S-1 through S-151) to mitigate effects. The cumulative effect of sediment deposition in stream channels from repeated episodes of earth disturbance is typically mitigated to acceptable levels by use of practices identified in *Forest Plan* Appendices R and S, or measures identified as a part of site-specific analysis. Sensitive soils (due to floodplains, steep slopes –greater than 50%, wetness, slippage, and soils formed from limestone and fine-grained shales and siltstones) present the highest risk for soil erosion, slippage, compaction, and potential for sediment delivery to streams. Low to moderately sensitive soils present less risk for these effects, and these effects can typically be mitigated by applying *Forest Plan* standards, or other practices which have been developed to mitigate effects to soil and water.

As a matter of practice, the Forest routinely restricts the normal operating season for major earth disturbing activities to April or May through November or December, depending on where the activity is located. This measure substantially reduces the risk for soil erosion, slippage and compaction; it diminishes the likelihood that sediment would be delivered to streams by controlling major earth disturbing operations during the wet period (November or December through April or May) so that adverse effects may be minimized or avoided. Effects of large-scale earth disturbance or conventional ground-based harvesting operations on low to moderately sensitive soils, also analyzed site-specifically, are typically mitigated by applying the *Forest Plan* standards and practices described above.

It is the Forest practice not to conduct large-scale earth disturbance or conventional ground-based harvesting operations on sensitive soil unless a site-specific analysis would indicate the effects of such activities could be mitigated. On the Forest, the acres of highest risk – acres with sensitive soils or geology – totaling ~160,000 acres of NFS land within MP areas that would typically have large-scale management activities, would not have large-scale earth disturbance or conventional ground-based harvesting operations unless a site-specific analysis determined that the effects of such would be within acceptable levels. An option for timber harvesting on sensitive soils includes using helicopters to carry harvested trees away from sensitive soil areas. This limits or avoids major earth disturbance in sensitive soil areas. Earth disturbance that occurs associated with the clearing and construction of helicopter landings, and use of Forest roads for hauling and can usually avoid sensitive soils or adequately mitigate effects by selecting landings on more gently sloping or drier sites, building or reconstructing roads to higher standards, for example.

METHODOLOGY

Proposed standards for primarily Indiana bat and WV northern flying squirrel contained within each alternative were examined to assess effects to soil and water resources. Only proposed standards that may affect soil and water resources, and standards' expected effects are discussed in the effects sections below.

The effects analysis examined the number of acres at increased risk for erosion, slippage, compaction, and potential for sediment delivery to streams above that of the No Action Alternative for each action alternative due to application of standards for threatened and endangered species and soil sensitivity. Soils information was used to generate acres of sensitive soils in all counties containing NFS lands, except Barbour, Tucker, Preston, and northern Randolph Counties; acres of sensitive geology (geologic units that tend to have sensitive soils formed over them) in combination with slopes greater than 50% was used as a surrogate to acres of sensitive soils in Barbour, Tucker, Preston, and northern Randolph Counties. The acreages added together were used to represent the total acres of sensitive soils or geology. Low and moderately sensitive, considered non-sensitive, soils or geology occur elsewhere on NFS land.

DIRECT & INDIRECT EFFECTS

No Action

There would be no change in the way soil and water standards would be applied to major earth-disturbing Forest management activities from that described in the Affected Environment section. Standards and direction in *Forest Plan* Appendices R and S would be applied; earth disturbing management activities affecting sensitive soils would be analyzed and avoided or mitigated; and the normal operating season for major earth disturbing activities would be April or May through November or December. Application of these practices to timber harvesting activities, including large-scale earth disturbance or conventional ground-based timber harvesting, helps minimize risk for soil erosion, slippage, and compaction, and potential for sediment delivery to streams.

Proposed Action

Under the Proposed Action, the standard that would allow large-scale tree felling for vegetation management to occur only from November 16 through March 31 in MP 6.3 (Indiana bat primary areas) (Appendix A, p. 15, MP 6.3, 1900 #3) would increase risks for adverse soil and water effects. The risk of effects would be greatest from major earth disturbing activities on low to moderately sensitive soil. This is because Forest management practices would make it unlikely that sensitive soil or geology would have major earth disturbing activities occurring very often during this period; hence, there would be a low risk for adverse impacts to soil and water resulting from operations on sensitive soils. About 51,000 acres of sensitive soils would be within proposed MP 6.3 areas. The remaining acreage of proposed MP 6.3 areas, about 105,000 acres, would have low to moderately sensitive soils.

The standard that would impose a seasonal restriction on tree felling in MP 6.3 would cause the following circumstances and potential effects. Since it is not practical, safe or reasonable to fell all trees in harvest units and on planned timber haul roads without removing them concurrently with felling, earth disturbance associated with felling trees in conventional, ground-based cutting units (overland skidding, skid road construction and use and haul road construction and use) would be expected to occur from November 16 through March 31 on low to moderately sensitive soils within MP 6.3, or not at all. If this earth disturbance would occur during this time period-the characteristically wetter times of year, there would be a substantial risk for soil erosion during periods of water run-off, soil slippage due to saturation, and soil compaction due to using heavy equipment when soils are wet, and potential for sediment delivery to streams. The only way to avoid the above-described adverse effects to soil and water would be to avoid conventional, ground-based logging in the winter wet period or use helicopter logging (see Timber Sale Program effects).

This means that the number of acres at increased risk for erosion, slippage, compaction, and potential for sediment delivery to streams from conventional, ground-based timber harvesting on low to moderately sensitive soils would range from 0 to 105,000 acres. There would be no acres at increased risk if conventional, ground-based logging would be avoided or if helicopter logging would be used everywhere in MP 6.3. There could be up to about 105,000 acres of low to moderately sensitive soils at risk if only conventional ground-based logging methods would be used.

If conventional, ground-based harvesting in MP 6.3 areas were to occur in the winter, when potential for the above described effects is greatest, there would be a substantial risk for instances of non-compliance with WV water resource rules under the Clean Water Act (personal conversation, Barry Edgerton, Hydrologist). In the Proposed Action, effects to soil and water from major earth-disturbing Forest management activities outside of MP 6.3 would be the same as those described in the No Action Alternative.

Alternative 1

Because there would be no seasonal restriction on tree felling in MP 6.3, effects to soil and water from major earth-disturbing Forest management activities would be the same as the No Action.

Alternative 2

Under Alternative 2, risk of effects to soil and water would not be increased because there would be no commercial large-scale tree felling, thus none of the associated earth disturbance within the Zoological Areas of Indiana bats. There would be no acres at increased risk for erosion, slippage, compaction, and potential for sediment delivery to streams from conventional, ground-based timber harvesting. Effects to soil and water from major earth-disturbing management activities outside MP 6.3 would be the same as described for the No Action.

CUMULATIVE EFFECTS

Past, present, and reasonably foreseeable earth disturbing activities on Federal and private lands have the potential to produce sediment that may be delivered to streams. Such activities on private land are expected to continue regardless of the alternative selected by the Forest Service. The No Action Alternative would not result in a change in cumulative effects to soil and water.

In the Proposed Action, there would be potential direct and indirect adverse effects to soil and water from conventional, ground-based logging in MP 6.3 because of the seasonal restriction on tree felling that could result in major earth disturbance in the winter. Winter harvesting that produces soil erosion and slippage could result in a cumulative loss of soil productivity over time. The indirect effect of sediment that would be delivered to streams because of winter activities in MP 6.3 is that sediment could accumulate in stream channels. Once in stream channels, especially in low gradient stream channels, sediment may remain for years to decades. Future additions of sediment from earth disturbing activities may add to the sediment in the stream channel. The accumulated sediment in these channels could have a tendency to be re-suspended, increasing turbidity, and diminishing water quality over time. If soil and water impacts were avoided by not using conventional, ground-based logging or by using helicopter logging within MP 6.3, the above-described cumulative effects are not expected to occur. Implementing the Proposed Action, if it included conventional, ground-based harvesting, could pose some risk for instances of non-compliance with WV water resource rules under the Clean Water Act (personal conversation, Barry Edgerton, Forest Hydrologist). All other alternatives would be consistent with the Clean Water Act.

Alternative 1 and Alternative 2 would not contribute additionally to cumulative effects on soil and water above those effects recognized for the No Action Alternative because it would not cause direct and indirect effects that would add to the effects of past, present and reasonably foreseeable future actions. However, under Alternative 2, the effect of prohibiting commercial timber harvesting in Indiana bat primary areas could reduce potential for sediment accumulation in stream channels, and result in improved water quality within MP 6.3 over time.

RIPARIAN & AQUATIC RESOURCES

AFFECTED ENVIRONMENT

The MNF is astride the Eastern Continental Divide and is drained by both Potomac and Ohio River Systems. About 3,000 miles of perennial and intermittent streams exist on the MNF, many of which are the headwaters of major river systems -- the Potomac, Monongahela, and New Rivers. Most of the Forest's streams are small, high to moderate gradient headwater streams providing cold, clean water to the Cheat, Greenbrier, Gauley, Tygart Valley, and a branch of the Potomac, which feed the major river systems. Streams and their banks, bed, and vegetation create a unique environment -- the riparian

ecosystem, which provides habitat for a variety of plants and animals. Anglers treasure one of its inhabitants –wild trout.

Forest Goal

Forest goals for watershed protection include protecting natural resources from damage or degradation (*Forest Plan*, p. 40), implementing soil and water improvements (p. 41), and managing riparian areas for stream bank stability, fish habitat requirements, and biodiversity (p. 82a).

Except for those impaired by acid rain, surface waters flowing from NFS land generally meet State and Federal water quality standards (*Forest Plan FEIS*, p. 3-14), (personal conversation, Barry Edgerton, Forest Hydrologist on State list of 303d, acid rain impaired streams). As such, many Forest streams are waters of special concern--containing water quality that meets State and Federal standards or capable of supporting wild or native trout (WV Department of Environmental Protection (WVDEP, 6/11/02).

About 350 miles of warm water streams flow through the MNF, of which 125 miles are fishable. There are ~200 acres of impoundments on the Forest (USFS, December 1990, p. 1). About ~600 miles of cold-water streams that flow through the MNF support trout: ~380 miles of native/wild (brook) trout streams; ~190 miles of stocked trout stream; and ~30 miles of trout stream that have not been differentiated as native/wild or stocked (USFS, December 1990, p.1). About 160 miles of cold-water streams are impaired by mine drainage and acid rain (WVDEP, 1998).

Trout fishing is popular in WV. In a 1985 survey, over 184,000 people fished for trout in WV that year (USFS, December 1990, p. 2). More than one-half of all trout waters in WV, including about 90 % of the State's wild/native trout water, occurs on the MNF (USFS, December 1990, p. 2; USFS, February 3, 1998).

The EA prepared for *Forest Plan Amendment # 3 for Fisheries and Recreational Fishing Management* identified that some of the most prevalent limits to trout habitat quality are the lack of pool habitat and habitat diversity provided by large woody debris in streams, the limited amount of spawning habitat due to stream gradient or high amounts of sediment in spawning gravels, and acidic conditions of some streams (USFS, December 1990, p. 2). Amendment #3 identified *Forest Plan* standards to address some of these habitat limitations. It recognized that existing standards, such as *Forest Plan* Appendix R-Riparian Area Management, and S-Soil Management Handbook, addressed others.

Research has shown fine sediment can adversely affect trout populations by affecting spawning success (Bjornn and Reiser, 1991, Hakala, 2000), habitat conditions (Everest, et. al. 1987, Waters, 1995), and macro-invertebrate populations (Kaller, 2001). The Forest defines fine sediment as sediment <4 mm in size and considers impairment of native brook trout populations to occur when spawning gravels contain >20% fine sediment. As of 1998, stream surveys indicated 60-70% of Forest streams have elevated fine sediment levels in spawning gravels resulting in serious impairment of trout reproduction (USFS, February 3, 1998).

The Soil and Water Resource section discusses how water quality is affected by sediment deposition, and how management practices under the *Forest Plan* work to reduce soil loss and the introduction of sediment to streams. In sum, standards and direction in *Forest Plan* Appendices R and S, mitigation that is identified during the site-specific analysis of earth disturbing activities, and controlling the normal operating season for earth disturbing activities reduces or avoids substantial risk for soil erosion, slippage, and compaction, and potential for sediment delivery to streams. However, sediment that reaches streams can reduce trout production and degrade aquatic habitats by increasing levels of fine sediment in spawning gravels and covering existing redds (eggs) deposited during the fall spawning season (generally October/ November). Rearing habitat could also be reduced if pool area is reduced by fine sediment. Furthermore, sediment that reaches streams can accumulate in stream channels and remain in them for years to decades, depending on a number of different factors, including the stream's gradient (NCASI, 1999).

The *Forest Plan* and Amendment #3 identified the need for and set the standards for developing the watershed and fisheries maintenance and restoration program (pp. 41, 80-81, and 82a-82c). The project work that would typically be expected to occur as a part of this program is described in the Riparian and Aquatic Resources Report in the project file. Site-specific analysis normally conducted on watershed, riparian and fisheries project proposals consider effects to threatened and endangered species and the biological evaluation, resulting in occasional adjustments made to the proposed project to avoid impacts to threatened and endangered species and their habitat (*USFS, September 2001 Revised Biological Assessment*, pp. 29, 37, 57, 74, 89, 96, 102, 108, and 112). Likewise, effects on riparian resources, if any, are considered during the site-specific analysis of threatened and endangered species project proposals, and they typically can be mitigated or avoided.

METHODOLOGY

The effects analysis quantifies the potential for increased risk to wild trout habitat for the action alternatives when compared to the No Action Alternative. Streams across the Forest represent considerable size variation, which makes it difficult to compare large groups of streams. Therefore, this analysis grouped streams according to 6th level Hydrologic Units (HUCs) established for the MNF to standardize the unit of measure for evaluating risk to wild trout populations. The 6th level HUCs encompass similar watershed area (10,000-40,000 acres) and provide for more consistent interpretations of stream comparisons. There are a total of 143 6th level HUCs on the Forest. The potential for increased risk for wild trout habitat degradation was assessed as the number of HUCs with wild trout that could experience increased risk of receiving sediment that could fill in spawning gravels and pools, or impact trout redds (eggs) in the stream from October 1 to May 1.

DIRECT & INDIRECT EFFECTS

No Action

Effects to riparian and aquatic resources would be the same as described in the Affected Environment section. Risk for trout habitat impairment due to the potential to deliver sediment to trout streams would likely be unchanged. Standards and direction in the *Forest Plan* Appendices R and S, mitigation identified during the site-specific analysis of earth disturbing activities, and controlling normal operating season for earth disturbing activities would continue to reduce or avoid substantial risk for soil erosion, slippage, and compaction, and potential for sediment delivery to streams (see Soil and Water Resources effects).

Due to the type and small scale of watershed and riparian work foreseen, standards for threatened and endangered species would not be expected to have a substantial effect on implementation of watershed and riparian restoration goals or projects. A minor effect could include an increase in some project costs because of site-specific mitigation for threatened or endangered species imposed on watershed and riparian work. For example, increased costs could come from the need to bring in materials like rocks, logs, or trees and shrubs for plantings to avoid impacting threatened and endangered habitat at the project site.

Proposed Action

Under the Proposed Action, a standard is proposed that would allow large-scale tree felling for vegetation management to occur only from November 16 through March 31 in MP 6.3 (Indiana bat primary areas) (Appendix A, p. 15, MP 6.3, 1900 #3). If this standard is adopted and major earth disturbing activities are implemented in areas with low to moderately sensitive soil during this time period, this alternative would produce the greatest risk for potential sediment delivery to streams (see Soil and Water Resources effects). Under existing Forest management practices, major earth disturbing activities would rarely occur on sensitive soils or geology from November 16 through March 31. If earth disturbance from conventional ground-based harvesting occurred within MP 6.3 during this time--when water run-off is usual and

expected --the risk of soil erosion, and consequently, sediment delivery to streams could substantially increase.

Once sediment is delivered to streams, it can reduce trout production and degrade aquatic habitats by increasing the levels of fine sediment in spawning gravels and covering existing redds (eggs) deposited during the fall spawning season (generally October/November). Rearing habitat could also be reduced if pool area is reduced by fine sediment. Furthermore, sediment that reaches streams would be expected to accumulate in stream channels and could remain in them for years to decades, depending on the stream's energy, mainly depending on the stream's gradient (NCASI, 1999). Ways to avoid increasing risk to aquatic resources, including fisheries, would be to avoid conventional, ground-based logging in the winter wet period or use helicopter logging (see Timber Sale Program effects).

Fifty three (53) 6th level HUCs occur within proposed MP 6.3. Of these 53 HUCs, 37 contain wild trout streams and have low to moderately sensitive soils in them that could be disturbed in the winter. Because conventional, ground-based timber harvesting may occur more often during wet periods as a result of the proposed seasonal restriction on tree felling, up to 37 6th level HUCs with wild trout streams could be at increased risk for trout habitat degradation within proposed MP 6.3.

In the Proposed Action, effects to riparian and aquatic resources from major earth disturbing activities outside of MP 6.3 would be the same as described for the No Action Alternative. The scope of watershed and riparian work foreseen (road, riparian and in-stream treatments, riparian protection, hill-slope stabilization, water chemistry improvement, and abandoned coal mine reclamation) usually would include only small scale or individual trees felling, brush or tree clearing, and earth disturbance within or nearby existing clearings or disturbed areas. If these activities would be proposed within threatened or endangered species' areas of influence, a site-specific EA and a biological evaluation would be completed. Generally, most foreseen riparian and aquatic project work would be allowed to occur, with occasional adjustments made to the proposed project to protect threatened and endangered species and their habitat (*USFS, September 2001 Revised Biological Assessment*, pp. 29, 37, 57, 74, 89, 96, 102, 108, and 112). A minor effect could be an increase in some project costs because of site-specific mitigation for threatened or endangered species imposed on watershed and riparian work (e.g. increased costs could come from the need to bring in materials like rocks or logs to avoid impacting threatened and endangered habitat present at the project site).

Alternative 1

Because Alternative 1 would not impose a seasonal restriction on large-scale tree felling within MP 6.3, potential effects to aquatic resources from sediment would be the same as the No Action Alternative. Thus, no streams would be at increased risk for trout habitat impairment. Effects to riparian resources from proposed standards are expected to be the same as under the No Action Alternative. The proposed standard that directs the Forest to retain or create small pools of water during log road abandonment, where appropriate, to provide additional drinking water for Indiana bats is not expected to be counter to watershed protection goals or interfere with implementation of watershed restoration work.

Alternative 2

Under Alternative 2, effects to aquatic resources from sediment would not be increased because there would be no commercial large-scale tree felling, thus none of the associated earth disturbance in Zoological Areas of Indiana bats. Outside of these areas, effects to aquatic resources would be the same as for the No Action Alternative. Therefore, no streams would be at increased risk for trout habitat impairment. Effects to riparian resources from proposed standards would be expected to be the same as under the No Action Alternative. The proposed standard that directs the Forest to retain or create small pools of water during log road abandonment, where appropriate, to provide additional drinking water for

Indiana bats is not expected to be counter to watershed protection goals or interfere with implementation of watershed restoration work.

CUMULATIVE EFFECTS

In the Proposed Action, there would be potential to degrade spawning habitat through the addition of sediment to streams because of the seasonal restriction on tree felling that could result in major earth disturbance in the winter in MP 6.3 (See Soil and Water Effects section). Sediment that reaches streams could accumulate in stream channels and remain for years to decades (NCASI, 1999). Any accumulated sediment in streams could reduce trout production and degrade aquatic habitats by increasing levels of fine sediment in spawning gravels and covering existing redds (eggs) deposited during the fall spawning season (generally October/November). Rearing habitat could also be reduced if fine sediment reduces pool area.

Alternative 1 would not contribute additionally to cumulative effects on aquatic resources and habitat above those recognized in the No Action Alternative because it would not cause direct/indirect effects that would add to effects of past, present, and reasonably foreseeable future actions on MNF or private lands.

Alternative 2 would not contribute additionally to cumulative effects on aquatic resources and habitat above those recognized in the No Action Alternative because it would not cause direct/indirect effects that would add to effects of past, present, and reasonably foreseeable future actions. Under Alternative 2, the effect of no commercial timber harvesting in Indiana bat primary areas could reduce potential for sediment accumulation in stream channels and result in improved aquatic habitat within MP 6.3 over time.

None of the alternatives would contribute to cumulative effects on riparian resources or restoration efforts above those recognized for the No Action because they would not cause direct/indirect effects that would add to effects of past present and reasonable foreseeable future actions on MNF or private lands. All the alternatives would be consistent with pertinent laws.

TRANSPORTATION

AFFECTED ENVIRONMENT

A network of U.S. highways, state primary and secondary roads, and NFS roads serve eastern WV and the MNF. The *Forest Plan FEIS*, pages 3-6 through 3-12, describe the Forest's road infrastructure as of 1986. As of 2000, the Forest managed ~1,800 miles of roads. Of these roads, ~1,100 miles (61%) are closed to vehicle traffic year round; ~540 miles (30%) are open to vehicle traffic year round; and ~150 miles (~9%) are open seasonally (USFS, 1999 *MNF Monitoring and Evaluation Report*, p 17).

Forest Goal & Projected Outputs

Information regarding transportation on the MNF can be found in the *Record of Decision for the Forest Plan FEIS (ROD)*, pp. 4, 11-14, 31, 33, 38, 43, and 45). The Forest goal for transportation is to construct and maintain a transportation system that will allow efficient management and safe public use of NFS lands (*Forest Plan*, Goal XV, p. 40) by providing and maintaining road developments to the density and standards needed to meet resource objectives (*Forest Plan*, p. 99).

The *Forest Plan* projected that during the period 1986-2000, 25 miles of road construction, 15 miles of road reconstruction, and 8 miles of road abandonment would be accomplished each year (*Forest Plan*, p. 42). In actuality, between 1987 and 1999, an average of 17 miles of road construction per year, 19 miles of road reconstruction per year, and 27 miles of road abandonment per year were accomplished (USFS, 1999, p 29-30). In fiscal year 2001, 14% of the Forest road system, or about 250 miles, received full maintenance, and about 34%, or about 600 miles, received some maintenance.

In the future, as in recent years, the Forest expects to emphasize use and reconstruction of acceptably located roads, rather than constructing new roads (USFS, 1999, p. 30). Future construction is not likely to exceed about 15 miles per year and is likely to be less. Road decommissioning is expected to increase as funding for watershed restoration increases. Inadequately designed and maintained roads, which can harm water quality, wildlife habitat, and other ecological values, or pose safety hazards to forest users, would be the focus of road decommissioning efforts.

The potential exists for road construction, reconstruction, decommissioning, and, to a lesser extent, road maintenance to impact threatened and endangered species and their habitat (*USFS, September 2001 Revised Biological Assessment* pp. 16-17, 28, 36, 56, 72-73, 88, 102, 107, and 111.). *Forest Plan* standards and project mitigations have provided an acceptable level of protection for threatened and endangered species from possible impacts associated with constructing and maintaining a Forest transportation system (*Forest Plan*, pp. 84-87). The application of these standards in practice has been that a project is relocated to avoid threatened and endangered species or it is not completed if planned road construction/reconstruction would extend beyond existing road clearing limits in areas containing populations of such species; this is because such activities typically produce adverse effects to threatened and endangered species. Therefore, road construction and reconstruction would be expected to be disallowed within threatened and endangered plant habitat (*USFS, September 2001 Revised Biological Assessment*, pp. 96, 102, 107 and 111; *Forest Plan*, pp. 84 and 87), Cheat Mountain salamander areas of influence (*USFS, September 2001 Revised Biological Assessment* pp. 34 and 36; *Forest Plan*, pp. 84 and 86), VA big-eared bat Zoological Areas (*USFS, September 2001 Revised Biological Assessment*, p. 72; *Forest Plan*, p. 234), within “occupied” WV northern flying squirrel habitat (within ½ mile of captures) (*Forest Plan*, Appendix X), and in the known Bald Eagle nest area (*USFS, September 2001 Revised Biological Assessment*, pp. 26 and 28).

Avoiding adverse impacts to small and/or large areas of threatened and endangered species habitat, in some cases, has affected transportation system options. For example, some access roads haven’t been built because developing access to some parcels of NFS lands would adversely affect threatened and endangered species (e.g. portions of Cheat Mountain salamander or WV northern flying squirrel habitat). Also, roads have occasionally been built in less preferable locations (e.g. steeper terrain), or more miles of road may have been built because the shortest access route would have adversely affected threatened and endangered species. In such cases, road construction and maintenance costs may be higher, or the cost of implementing a project without road access may be greater (e.g. when helicopter logging is used in areas that otherwise could have been harvested via conventional, ground-based logging methods).

Road construction and reconstruction for vegetation management has not typically been allowed in “occupied” WV northern flying squirrel habitat (within ½ mile of squirrel captures) (*Forest Plan* Appendix X). However, this has not directly affected the Forest’s ability to construct a transportation system at the density and standards needed to meet resource objectives within “occupied” habitat; this is because Forest roads are built for access to manage land, and most vegetation management activities generally have not been allowed in “occupied” WV northern flying squirrel habitat (*Forest Plan*, Appendix X).

The presence of “occupied” habitat has had an indirect effect on transportation in that it has prevented existing roads from being extended into some areas that require road access for management. Although the areas inaccessible by transportation systems because of “occupied” habitat are few, they are likely to increase as more WV northern flying squirrels are captured and more “occupied” habitat is identified.

Unless specifically determined to be adverse to threatened and endangered species, most road maintenance has been implemented. Occasionally, site-specific mitigations (e.g. restrictions on clearing limits or disturbance outside the road template) have been implemented to avoid adverse effects to species.

METHODOLOGY

The proposed standards contained within each alternative were examined to assess changes in the ability to construct and maintain a transportation system that will allow efficient management and safe public use of NFS lands at the density and standards needed to meet resource objectives. The effects of the alternatives on the Forest Service transportation system were compared qualitatively.

DIRECT & INDIRECT EFFECTS

No Action

This alternative would not change effects to the transportation system from those described in the Affected Environment. In the long term, as more WV northern flying squirrel are captured and, consequently, more “occupied” habitat is identified, ~6,000 to 7,000 acres of NFS land that require road access for management would not be accessible by Forest roads. This is because roads could not be built through squirrel “occupied” habitat to connect the end of an existing road system to a non-occupied area in which vegetation management could occur. Other options for accessing unsuitable squirrel habitat to implement vegetation management (e.g. helicopter logging) would be used or vegetation management would not be completed.

Proposed Action

The Proposed Action would not substantially affect transportation resources on the MNF or the Forest’s ability to manage such resources. Outputs would fall within the range authorized by the existing *Forest Plan*. The following pages identify the standards that could affect transportation management and describe the potential effects of the standards.

Minimizing or eliminating threats to threatened and endangered species due to non-native invasive species (Appendix A, p. 5, Forest-wide standards, #12) could affect the Forest transportation system because these measures could increase the construction, reconstruction, or maintenance costs of roads. Because existing *Forest Plan* direction encourages the use of native species when restoring disturbed areas (*Forest Plan*, p. 54, 1900A), the proposed standard for threatened and endangered species habitat would not result in substantially different practices, and the overall effect on road costs would be expected to be minor.

Indiana bat

No effects on the ability to perform road maintenance would be expected within Indiana bat key areas, primary ranges, around known roost trees, or maternity colonies. This is because there are no standards that would prevent road maintenance, particularly when such maintenance is done for public safety.

Because road construction and reconstruction is expected to be allowed in MP 6.3 (Indiana bat primary range) after consultation with the USFWS, no overall change is expected in the ability to construct or reconstruct roads in Indiana bat primary range (Appendix A, p. 14, MP 6.3, Desired Future Condition description). Exceptions may occur in specific cases where the road construction and reconstruction costs may be so high due to mitigation to protect soil and water (see last paragraph under this section) that the project would be economically infeasible.

The proposed standards that protect known roost trees (Appendix A, p. 7, Forest-wide standard, Indiana bat, #5) and avoid Indiana bat key areas and hibernacula or obliterate existing roads (Appendix A, p. 38, Zoological Area, 7710) could result in added length and increased road construction costs, or not building the road to avoid these areas. Because 1) key areas surrounding hibernacula are small (~2,500 acres); 2) few roost trees are confirmed (*USFS, September 2001 Revised Biological Assessment*, pp. 44-45); and 3) existing Forest system roads would likely be retained in key and roost areas, the effect on the Forest transportation system from key area and roost tree protection standards overall would be expected to be minor. The above-reference proposed standard would also prohibit road construction or reconstruction within two-mile radii of an Indiana bat maternity colony. Because implementing this standard would

affect a large area (up to about 8000 acres as defined by an area with a 2-mile radius), if maternity colonies are discovered, it is possible that implementing the proposed standard would result in some areas normally managed and accessed by a Forest transportation system would be inaccessible because road construction or reconstruction to them that would need to be located through the maternity colony area would not be allowed. However, since there is a low probability for the discovery of maternity colonies on the Forest (*USFS, September 2001 Revised Biological Assessment*, p. 44), it is not expected that there would be substantial areas of the Forest where road construction or reconstruction would be affected by Indiana bat maternity colony standards. Unless multiple maternity colonies are discovered, the proposed standard for protecting maternity colonies is not expected to have an effect on the Forest transportation system.

The proposed standard that prohibits large-scale vegetation management between April 1 and November 15 in the primary range (Appendix A, p. 15, MP 6.3, 1900 #3) may result in timber harvesting and hauling on Forest roads in the winter when wet conditions and repeated freeze-thaw cycles would be prevalent. In some areas, to avoid adverse soil and water effects, roads would either not be built or would need to be constructed to higher standards or improved to support all-season use, and this would likely need to include full stone surfacing and more frequent maintenance, and would likely result in substantially higher road construction and maintenance costs. This proposed standard would also prohibit tree felling for road construction or reconstruction associated with timber harvest during this period. Thus, road construction and reconstruction, including earth disturbance associated with this roadwork would be likely to occur during the winter (See Soil and Water effects section), resulting in additional costs because more extensive erosion and sediment controls would likely be needed.

WV northern flying squirrel

Road maintenance would still be allowed, although clearing limits may be restricted to prevent opening the tree canopy too much and adversely affecting WV northern flying squirrel.

The proposed standard that would disallow road construction and reconstruction in suitable WV northern flying squirrel habitat Zoological Areas except under limited circumstances (i.e. allowed for research, gas development, access to private land, etc.) at levels predicted within the *Revised Biological Assessment* after consultation with USFWS (*USFS, September 2001 Revised Biological Assessment*, p. 88) would have effects similar to No Action, but on different acres. Because the Zoological Area boundary would be defined differently in this alternative (all suitable habitat, not just within ½ mile of captures), in the short term there would be more acres in which road construction and reconstruction would not be allowed than under the No Action Alternative. However, in the long term under the Proposed Action, the number of acres in which road construction and reconstruction would not be allowed would be expected to be the same or less than under the No Action Alternative. This is because under No Action it is expected that WV northern flying squirrel captures would fill in, or in some cases exceed, the remaining acres of suitable habitat, causing them to be managed as “occupied” habitat.

An indirect effect on the Forest transportation system would be that an estimated 6,000 to 7,000 acres of NFS land that require road access for management would not be accessible by Forest roads. This is because roads could not be built through WV northern flying squirrel suitable habitat located between the end of an existing road system and the unsuitable habitat in which vegetation management could occur.

Alternative 1

Indiana bat

The effects on road maintenance, and road construction and reconstruction in key areas, at hibernacula, within maternity colonies, and around known roost trees would be the same as for the Proposed Action. Alternative 1 would not impose seasonal restriction on large-scale tree felling, so commercial timber sales and road construction and reconstruction within the primary range of Indiana bats could be implemented

any time of the year. Because of these differences, there would be no change in effects on road construction and reconstruction within the primary range of Indiana bat from the No Action Alternative.

WV northern flying squirrel

Effects caused by this species' standards would be the same as those of the Proposed Action.

Alternative 2

Indiana bat

The effects on road maintenance, and road construction/reconstruction in key areas, at hibernacula, within maternity colonies, and around known roost trees would be the same as described for the Proposed Action. There would be no seasonal restrictions on tree felling, so road construction and reconstruction could be implemented in Indiana bat primary range after consultation with the USFWS, regardless of the time of year; no overall change is expected in the ability to construct or reconstruct roads in Indiana bat primary range. However, because Alternative 2 would not use commercial harvesting to accomplish vegetation management within the primary range, a relatively small amount of vegetation management, and little road construction or reconstruction would be expected to be needed to provide access to manage vegetation; so fewer roads are likely to be built than under other alternatives. Since Forest roads could still be built for access to accomplish other resource management objectives, there would be no direct effect on the ability to construct a transportation system at the density and standards needed to meet resource objectives within Indiana bat primary ranges.

WV northern flying squirrel

The effects on the Forest transportation system due to standards for WV northern flying squirrel are the same as those shown in the Proposed Action.

CUMULATIVE EFFECTS

The seasonal restriction for tree felling under the Proposed Action could result in higher road construction, reconstruction, and maintenance costs within or to access MP 6.3 areas. These costs could accumulate such that the transportation system costs as a result of managing the 156,000 acres of MP 6.3 could be substantially higher than under the No Action Alternative.

None of the other action alternatives are expected to cumulatively affect the management of the Forest transportation system such that the Forest's ability to construct and maintain road developments to the density and standards needed to meet resource objectives would be adversely affected. Outputs would remain within the range authorized by the existing *Forest Plan*. Alternatives 1 and 2 are not expected to cause direct or indirect effects that would add to the effects of past, present, or reasonably foreseeable actions above the effects expected to occur under the No Action Alternative. All alternatives would be consistent with National Forest Transportation System regulations.

TIMBER SALE PROGRAM

AFFECTED ENVIRONMENT

Timber resources of the MNF are described on pages 3-15 to 3-17 of the *Forest Plan FEIS*. The MNF's timber sale program is guided primarily by two Forest goals:

Forest Goals

Goal VI establishes that vegetation on the MNF will be managed "according to sound professional procedures, in order to provide a sustained yield of timber, benefit other resources, and support the local economy with concern for environmental protection and cost efficiency. Both silvicultural

systems and all harvest methods would be used, however even-aged management would predominate in order to provide long term wildlife and timber quality benefits. Long rotation ages would normally be used to achieve large tree sizes. Conifers would be managed in mixed hardwood stands where possible.” Goal VII states: “Provide a stable supply of Forest products to dependent wood using industry. Encourage the development of secondary wood using industries in West Virginia. Encourage cable harvesting technology in the logging industry,” specifically the provisions involved with a sustained level of timber production for the use of local industry address the timber output aspect of the timber management program of the Forest. Goals VI and VII address other aspects of timber management, but those aspects are dealt with elsewhere in the EA if necessary to this analysis.

Projected Outputs

Timber harvest levels are generally described in “million board feet” (mmbf) quantities; but mmbf quantities are based on acres available for regeneration and improvement harvests each year. Projected regeneration harvests of ~2,135 acres per year (1,785 acres of even-aged regeneration plus 350 acres of uneven-aged regeneration, *Forest Plan*, p. 44), combined with 3,892 acres of intermediate harvests (thins or improvement cuts), resulted in *Forest Plan*’s projection of 6,027 acres/year of timber harvest.

The Land Classification Summary, Appendix B of the *Forest Plan*, describes the land categorization process that was used for forest planning. The net result of *Forest Plan* land allocations was an undefined 331,160-acre “timber base” floating within ~534,312 acres of the National Forest not currently within or planned for a more specific purpose:

- ~723,670 acres of tentatively suitable for timber harvest
- ~124,491 acres for MP 6.2 (this figure includes the ~120 acres protected for Cheat Mountain salamander, ~90 acres for threatened and endangered plants, and ~500 acres for bald eagle)
- ~1,902 acres of Cheat Mountain salamander and threatened and endangered plants in MP 2.0, 3.0, 4.0, and 6.1 (does not include acres protected within MP 5.0, 6.2, and 8.0 areas)
- ~ 40 acres of VA big-eared bat Zoological Area and/or Indiana bat Zoological Area
- ~ 62,905 acres (prescribed for old growth and permanent openings)
- ~534,312 acres of tentatively suitable land not currently within or planned for a more specific purpose

Since the *Forest Plan* was approved, the MNF acreage has expanded (e.g. via purchase, donation, etc.). Some of the acres gained have been assigned to MPs available for active timber management (MP 2.0, 3.0, 4.0, and 6.1). Because of this additional acreage, and the fact that the 331,160-acre timber base was expected to remain constant regardless of any increase in the size of the Forest, a pool of ~553,000 acres are available for commercial timber management from which the 331,160-acre timber base could come.

Provided *Forest Plan* standards and implementation remain constant, the volume of timber potentially available to industry, the ASQ (Allowable Sale Quantity), was expected to change each decade as the average volume per acre increases as stands mature. ASQ is derived from the acreage of the timber base that is more technically called regulated forest land. This is the portion of the National Forest available and managed for the sustained yield of timber products. ASQ was and is not expected to come from timber harvests conducted on land not included in the 331,160 acres of regulated forest land. It is possible that timber production could come from the unregulated portion of the Forest. For instance, timber could be produced and sold as a by-product of a wildlife habitat improvement project on MP8 lands because the improvement could not be done effectively or efficiently via other means. However, timber harvest on unregulated lands would normally be unusual and minor. The distinction would be that timber harvests on regulated land would be conducted primarily to improve future timber productivity and yield; whereas, timber harvest on unregulated land would be done to improve current or future conditions for the resource determining what trees needed to be cut or what type of harvest needed to be done. For this reason, besides normally being relatively insignificant, unregulated timber harvest would usually be unscheduled.

METHODOLOGY

Effects of the alternatives on the timber output capacity of the Forest were generally discussed quantitatively. Acres available for management was used as the main unit of reference: primarily because *Forest Plan* harvest levels are predicated upon acres of disturbance, but secondarily because of the correlation of timber production to acres of timber base. The *Forest Plan*'s allocation of 331,000 acres to timber commodity production was the benchmark reference, and the acres available for timber commodity production was the measure of effect. The average volume of timber potentially available for sale each year (ASQ) was then extrapolated by a proportionate comparison of alternative acres available for timber management to the 331,000-acre timber base standard. When acres available for the timber base meet or exceed the 331,000-acre standard, no effect on the *Forest Plan*'s timber capacity was noted.

DIRECT, INDIRECT, & CUMULATIVE EFFECTS

No Action

There would be no appreciable change in how the *Forest Plan* is implemented (Affected Environment). The No Action Alternative would not affect the Forest's ability to conduct timber harvest or manage the acres projected in the *Forest Plan*.

The effects of the No Action Alternative on the Cheat Mountain salamander and all threatened and endangered plants would remain the same as described in the Affected Environment section; ~1,900 acres within MP 2.0, 3.0, 4.0, and 6.1 areas would not be available and managed for the sustained yield of timber products.

VA big-eared bat and Indiana bat

Zoological Areas were established for both the Indiana bat and the VA big-eared bat under the *Forest Plan*, but standards for these species were the same because, in several instances, the same cave entrances and travel corridors were used by both species. The basic protection measures for both species (a 200-foot radius around the cave opening and any maternity colony, and a 330-foot wide travel corridor between cave entrances and foraging areas) would remain the same under the No Action Alternative. About 40 acres would remain unavailable and could not be managed for the sustained yield of timber products.

WV northern flying squirrel

Current land designated for WV northern flying squirrels (acres within ½ mile of capture sites) outside of MPs 5.0 and 6.2 (which do not authorize timber management and are not part of the timber base) total ~59,000 acres. These acres have already been factored out of the potentially available pool of acres, and would not jeopardize the *Forest Plan* commitment of a timber base. The timber sale program for the next half-decade (2003-2007), either in terms of ASQ or acres managed, would not be affected because both expected ASQ and acres managed are less than those under the *Forest Plan*.

Continued sampling in potential WV northern flying squirrel habitat would undoubtedly result in more captures and more half-mile radius protected circles. Since not all areas have been sampled, the number of future captures cannot be accurately estimated. However, approximately 100,000 acres of the National Forest in MPs 2.0, 3.0, 4.0, and 6.1 (in addition to the 59,000 acres factored out of the pool of potentially available acres) meet the "Potentially Suitable Habitat" criteria of Appendix X, and using that acreage gives an estimate of the land that might reasonably be expected to be affected by half-mile radius circles over a short-term WV northern flying squirrel trapping program. Deducting an additional 41,000 acres from the *Forest Plan*'s 553,000 acres of land potentially available for timber management acres would result in the timber base floating in a 512,000-acre pool.

Since 512,000 acres would exceed the 331,000 needed to meet projected outputs, the No Action Alternative would not limit the acreage necessary to meet *Forest Plan* ASQ. Since the half-decade program projections are two-thirds of *Forest Plan* level, no effect on the half-decade program would result.

The cumulative effects that implementing other *Forest Plan* standards and management practices would have on the acres available for the timber base pool were considered. No past, present, or reasonably foreseeable future programmatic actions on MNF lands or on private lands are known that would largely affect the pool of acres of the potential timber base. However, the Forest has, and is expected to continue to apply site-specific mitigation measures as appropriate to protect various resources, and such project-level measures may affect acres available for timber production. A good example of this would be mitigation that has been implemented during timber sale operations to protect riparian areas and their values. Implementing such site specific measures has the potential to affect about 2-30% of the available timber base in an area because they can require that canopy closure be maintained or strips of vegetation be protected from cutting for riparian area protection. The actual acres protected or avoided would not be the same for every project and would be determined at the site-specific level.

Proposed Action & Alternative 1

The effects of the Proposed Action and Alternative 1 differ in few ways.

The effects of the Proposed Action and Alternative 1 on the Cheat Mountain salamander and all threatened and endangered plants would remain the same as under the No Action.

The number of acres protected and managed for VA big-eared bat would be the same under the Proposed Action and Alternative 1 as under the No Action Alternative. However, under the Proposed Action and Alternative 1, the foraging corridor would not be officially identified as Zoological Areas for VA big-eared bats because it would become a Forest-wide standard that would apply outside Zoological Area boundaries (Appendix A, pp. 6 and 24).

The Proposed Action and Alternative 1 would include language specifically allowing timber harvest actions in MP 8.0 VA big-eared bat Zoological Areas (Appendix A, pp. 23 and 24), but harvesting would be uncommon. VA big-eared bat habitat is, and would be considered unregulated forestland, and harvesting activity would be for specific VA big-eared bat habitat improvement reasons rather than for timber management reason.

Indiana Bat

Several Forest-wide standards revising No Action practices for the benefit of the Indiana bat are identified in the Proposed Action and Alternative 1. These standards include:

1. Retention of all shagbark hickory trees in all cutting units across the entire Forest, except where public safety is a concern (Appendix A, p. 7, #13 (c) (3)). This standard is a minor stipulation despite its Forest-wide application; shagbark hickory is not plentiful on most MNF sites, so the numbers of trees to be protected would not be significant. Because of the low economic value of the species, very little economic loss would accrue.
2. Protection of all known roost trees on the Forest until they no longer serve the purpose because of decay, loss of bark, or simply falling over (Appendix A, p. 7, #13 (c) (5)). Although protection would likely involve protection of adjacent “guard” trees as well, the accumulated impact of this Forest-wide standard is expected to be minimal since few roost trees have been identified to date (*USFS, September 2001 Revised Biological Assessment*, pp. 44-45).
3. Snag retention in all cutting units, whether thinning or regeneration, across the entire Forest (Appendix A, #13 (c) (4)). The effects of this standard would vary little from the No Action. This Forest-wide standard stipulates creation of replacement snags when any cutting unit does not have an average of at least six, nine-inch diameter (dbh) or larger, snags per acre. All active-management MPs (2.0, 3.0, 4.0, 6.1) (MP 7.0, ~1,559 acres managed for high-density recreation, is not considered an active resource management MP for the purposes of this timber management discussion) currently have snag retention requirements, although MP 2.0 specifies retention of snags or culls. And all have a minimum number to be retained per acre (at least 3), except for MP 6.1, which protects all snags.

4. The Proposed Action and Alternative 1 would maintain the existing protection around cave entrances, and expand it to include a minimum of 150 acres around the cave and cave entrance where appropriate (Appendix A, pp. 29 and 34). This expanded area – the key area – would provide more protection to the immediate vicinity of the cave and preferred foraging habitat in that area. Indiana bat Zoological Area classification under the Proposed Action and Alternative 1 would total ~2,500 acres on the National Forest, an increase from the No Action Alternative. Although commercial timber harvest could occur within these key areas in the Proposed Action or Alternative 1 (as it could within the 200-foot circles or travel corridors in No Action), any harvesting would strictly be for Indiana bat habitat improvement. Key areas would not be part of the regulated timber base in either alternative. Similarly, maternity colonies, if found and confirmed, would become part of Indiana bat Zoological Areas and removed from the regulated timber base.
5. Both alternatives introduce the concept of “primary range” (Appendix A, pp. 7 and 13-14). The primary range proposed to be designated as MP 6.3 normally would include all NFS land within a 5-mile radius of a hibernaculum, except for the hibernaculum, the cave opening, and the key area (all of which have more restrictive standards). Five-mile radius circles each would encompass ~50,000 acres after exclusion of the hibernaculum, the cave opening, and the key area. Excluding key areas and cave openings, and excluding MPs 5.0, 6.2, and 8.0 which are more restrictive on management than other MPs, 156,000 acres of the National Forest would fall within this new MP 6.3. Although timber management would be a secondary goal of MP 6.3 primary ranges, MP 6.3 would remain part of the potential timber base. Management standards applicable to the MPs 2.0, 3.0, 6.1, and 7.0 from which MP 6.3 would be derived may continue to apply unless inconsistent with MP 6.3 standards. Similarly, as in Indiana bat Zoological Area delineation, any land in MPs 5.0, 6.2, or 8.0 that would fall within the Indiana bat primary range would not be assigned to MP 6.3 because the standards already existing there are more restrictive. MP 6.3 standards may be applied to those MP 5.0, 6.2, and 8.0 primary ranges, however, to the extent that they are not in conflict with MP 5.0, 6.2, and 8.0 standards (Appendix A, p. 14).
6. Forest-wide standards for roost tree protection and shagbark hickory retention would continue to apply to MP 6.3 under the Proposed Action and all Action Alternatives. Under both alternatives, the basic Forest-wide snag standard would be retained, but it would be enhanced by prioritizing the size of snags to be created when snag creation is necessary (Appendix A, p. 16). Under MP 6.3 1900.4.c, trees to be girdled and left as snags would come from the larger diameter classes (16 inches dbh and larger) first. Killing otherwise merchantable trees would reduce both the volume and value realized on virtually each acre of MP 6.3 harvested. While the volume and value effect would be relatively insignificant on other MPs because smaller trees would be involved, setting this much larger minimum diameter would dramatically increase the volume affected. As an example of both extremes, girdling six nine-inch trees per acre would not result in any sawtimber volume loss, whereas girdling six sixteen-inch trees per acre would result in the loss of about one mbf per acre, or almost 10% of the sawtimber volume realized per average acre of regeneration harvest. This is a measure of the effect of extreme situations however, because the size prioritization applies only to MP 6.3 (under both the Proposed Action and Alternative 1), and only when replacement snags would have to be created. Despite the loss of sawtimber volume, however, loss of value would be minor, assuming that lower-valued trees would be selected for girdling under both alternatives, just as they would be for the Forest-wide snag creation standard.
7. The MP 6.3 1900.4.d cull retention standard – to retain at least five cull trees per acre – would apply to both the Proposed Action and Alternative 1, and would represent an increase of 2-5 culls retained per acre in MPs 2.0, 3.0 and 4.0 (Appendix A, p. 16). In all MPs, this standard would establish preferred species and sizes of culls to be retained. Disregarding the species and size preferences, this standard would replicate the MP 6.1 cull standard, and reflects the wildlife priority integral to MP 6.1. Similarly, the MP 6.3 2470.4.c. (1) leave clump standard would imitate the MP 6.1 standard (Appendix

A, p. 20). Since 141,000 acres of the 156,000 acres in MP 6.3 would be derived from MP 6.1, the numbers of cull trees protected represents a relatively minor expansion in the MP 6.1 approach. Meeting the species or size preferences in the standard would not reduce timber sale viability, assuming preferred selections would be made from trees currently having little or no economic value due to existing defects, rather than any intentional damaging of otherwise healthy or commercially valuable trees to meet size or species preferences.

8. Some management constraints would change under MP 6.3 however. While the normal 5% land allocation to wildlife openings would continue in MP 6.3 under both the Proposed Action and Alternative 1, the normal 5% old growth reservation would quadruple under both alternatives (assuming management chooses not to manage or harvest old growth). The additional 15% allocation to old growth would result in an additional ~23,000 acres becoming unavailable for timber management (Appendix A, 2600, #1, p. 21). If timber harvests become a customary practice in old growth this reduction in acres would not be applicable.
9. The timing of timber management harvest within MP 6.3 (the balance of the NF land within a five-mile radius of a hibernaculum) would be the main difference between the Proposed Action and Alternative 1 (Appendix A, pp. 15 and 32). Alternative 1 would not impose any timing restriction for the protection of individual Indiana bats because it was not required as a Term and Condition of the USFWS' *Biological Opinion*. The Proposed Action would continue the pre-*Biological Opinion* site-specific practice of only allowing timber felling within five-mile radii of hibernacula to occur during the Indiana bat hibernation period of November 16 through March 31, thus essentially eliminating the risk of take of individual bats. This timing restriction on MP 6.3 would affect approximately 117,000 acres (156,000 acres of MP 6.3, less the 25% of reservations for wildlife openings and old growth) of land potentially available for timber management.

Under the Proposed Action, the timing restriction (which would prohibit felling trees between April 1 and November 15) would generally consign all but small timber offerings or units to helicopter logging rather than the conventional ground-based tractor/skidder operations for several reasons. First, ground disturbing activities between late November/early December and most of April if not early May would occur in the period when wet, soft ground conditions predominate. During this period, rutting damage to roads and skid trails, and subsequent water quality issues, become concerns. In general, ground based logging usually occurs during the period mid-April/early May to late November/early December. Because of the frequency of suspension of operations due to soft ground and/or precipitation, operations do not normally continue to or after the Christmas holiday unless very cold or dry conditions prevail. And once equipment is removed in the fall, the unreliability of continuous operating conditions during the winter makes return before the spring season an infrequent occurrence.

This general soil-sensitivity can be broken down further. In the case of highly sensitive soils, which include approximately one-third (51,000 acres out of 156,000 acres) of Indiana bat primary ranges, conventional logging during the winter would not normally be considered because of the risk of serious rutting, compaction, or sediment delivery to streams. These areas would normally be summer-only tracts in harvest design. Restricting these areas to the November 16 through March 31 season would effectively turn them into no-log or helicopter-log tracts. (Accepting that the one-third sensitive soil class is evenly distributed over the 117,000 acres of primary ranges not allocated to wildlife openings or old growth would indicate that 39,000 acres of Indiana bat primary range timber pool would be unavailable for conventional logging practices.)

In the case of low to moderately sensitive soils in primary ranges – about 105,000 acres total, or 78,000 acres of the potential timber base in primary ranges – the risk of slippage, erosion, compaction, and/or sediment delivery to streams would vary in severity. Hydrologist opinion (Edgerton, Barry pers. Conv.) is that there would be substantial risk of instances of non-compliance with WV water resource rules under the Clean Water Act even on low to moderately sensitive soils being logged during the winter.

This risk would not be incurred on all sites, but would be subject to a site-specific analysis.

In summary, soil sensitivity would be a determining factor affecting logging operations and economics if November 16 through March 31 is the only authorized timber-felling period, as it would be under the Proposed Action. The effect would cover a range of acres in the potential timber pool, from a virtual no-log or helicopter-only scenario on highly sensitive soils, to a no-log or helicopter-log scenario on as many as 78,000 acres of low to moderately sensitive soils. The operational effect of helicopter-only harvesting cannot be estimated without site-specific analysis, but the economic effect would involve an added cost of approximately \$200 per thousand board feet, or about \$2,000 per acre on the average acre of regeneration harvest.

Helicopter logging, although benign with respect to some environmental effects, has serious limitations. It is extremely expensive – about triple the cost of conventional logging – and generally limited to a $\frac{3}{4}$ -mile distance from a log landing. Because of equipment availability on the east coast, helicopter logging must generally be done during the fall and winter months, which generally means early or snow-free winter months, because timber is felled in large blocks to take advantage of the speed of helicopter operations. Since felled and limbed timber can easily be lost under relatively small amounts of snow, and because economic considerations preclude return trips later on to recover missed trees, felling operations on east coast helicopter operations tend to start when leaves drop in early to mid-October to maximize pre-snow helicopter yarding. A November 16 start date for helicopter felling operations would add significant economic risk to an expensive proposition by delaying the onset of felling operations, which generally would involve a month or more of felling before the helicopter arrives, to the start of the snow season.

Under Alternative 1, all 117,000 acres of otherwise unencumbered timber management ground in MP 6.3 areas would potentially be available for timber harvesting during the drier summer season when risks to soil and water quality would be less. Although the method used to remove timber from a harvest site would be determined at a site-specific level, conventional, ground-based timber harvest (not just helicopter yarding) could be considered a viable alternative. It would be most significant in the case of 51,000 acres of sensitive soils, which would be helicopter-required under the timing restriction of the Proposed Action. Helicopter logging would remain a viable option within MP 6.3 as it would in other areas of the Forest, but it would not be a requirement in MP 6.3 under Alternative 1, so it would not have any more effect than existing *Forest Plan* implementation on potential harvest acres or volume, or on harvesting expense.

10. Alternative 1 also would differ from the Proposed Action in the timing of large-scale vegetation management activities on stems larger than 5 inches dbh within Indiana bat Zoological Areas (Appendix A, pp. 31-32). The Proposed Action would follow existing site-specific mitigation practices by restricting vegetation management of larger stems to the period November 15 through March 31 (see existing condition in Chapter I). Alternative 1 would not impose timing restriction on management of larger stems within Indiana bat Zoological Areas. Despite this distinction between alternatives, the effect on the timber base would remain the same because any vegetation management done in Indiana bat Zoological Areas must be for the protection and/or enhancement of Indiana Bat habitat or for public safety, not for timber management objectives.

WV northern flying squirrel

Under both alternatives, changing the area protected for WV northern flying squirrels from “occupied” to “suitable” habitat would affect the acres available for timber management (Appendix A, pp. 11 and 39). About 110,000 acres of WV northern flying squirrel suitable habitat would be removed from MPs that have been available for timber management (MP 2.0, 3.0, 4.0, and 6.1). This would represent the removal of an additional ~51,000 acres from the pool of timber base acres, as compared to the No Action Alternative.

Summarized Effects of the Proposed Action and Alternative 1

Restrictions or allocations would reduce the 553,000-acre pool of potential timber base to ~476,500 acres:

- ~2,500 additional acres for Indiana bat key areas, hibernacula, and
- ~23,000 additional acres (~15%) for increased old growth reservation in Indiana bat primary ranges*
- + ~51,000 additional acres for suitable WV northern flying squirrel habitat
- ~76,500

*This assumes none of the 20% old growth would ever be harvested via commercial timber harvests. This is the maximum effect anticipated to result from the proposed old growth standard.

Since the resulting ~476,500-acre pool would exceed the 331,000 acres required for the timber base, the Proposed Action would not restrict the timber base allocation of the *Forest Plan*, except that ~117,000 acres within five-mile radius of Indiana bat hibernacula would largely become helicopter-required harvest areas because of the timing restriction on felling operations (see Soil and Water effects).

Just as the Proposed Action did, Alternative 1 reductions would leave ~476,500 acres available for the timber base pool. Because the 331,000 acres of timber base would be maintained under Alternative 1, there would be no restriction on the *Forest Plan*'s timber allocation. Alternative 1 would fully meet the Terms and Conditions of the *Biological Opinion* without imposing a timing restriction on timber felling operations in Indiana bat primary ranges--restrictions that could potentially affect the acres available for timber production. As many as 117,000 acres within Indiana bat primary range would potentially be available to conventional harvesting operations – which could result in a benefit to local companies as well as a reduction in harvesting costs. Alternative 1 would maintain helicopter logging as a viable management tool, but would not force its use where it would otherwise be unnecessary.

Neither the Proposed Action nor Alternative 1 would affect the Forest's ability to conduct timber harvest or manage the acres projected in the *Forest Plan*. No past, present, or reasonably foreseeable future programmatic actions on MNF lands or on private lands are known that would substantially affect the pool of acres of the potential timber base; but implementing site-specific actions are likely to result in cumulative effects to the 476,500-acre timber base. The Forest has, and is expected to continue to apply site-specific mitigation measures as appropriate to protect various resources. The actual acres protected or avoided would not be the same for every project and would be determined at the site-specific level, but such project-level measures affect acres available for timber production. For example, in the past, present, and reasonably foreseeable future, the MNF retains adequate canopy closure within riparian areas to protect riparian area values. Depending on the site-specific conditions, an additional 2-30% of the timber base may be protected to preserve riparian area values, acres that effectively become unavailable for harvest. Another example is that some portion of the acreage within MP 6.3 would not be harvested if the Proposed Action were implemented because of potential soil and water risks associated with conventional ground-based harvesting in the winter. These reservations effectively reduce the acres available for timber production, but they are not a permanent foregoing of an opportunity.

Alternative 2

For the most part, the effects that Alternative 2 would have on acres available for timber production would be the same as the Proposed Action and Alternative 1. Alternative 2 would differ from the Proposed Action and Alternative 1 in that the primary range would be allocated to Indiana bat Zoological Areas instead of MP 6.3; and each 5-mile radius circle would be entirely excluded from commercial timber management, so all ~156,000 acres of primary range, as well as the ~2,500 acres in key areas and 200-foot cave opening circles, could not be part of the potential timber base. Altogether, restrictions or allocations would reduce the 553,000-acre pool of potential timber base to ~344,000 acres:

~2,500 additional acres for Indiana bat key areas, hibernacula, and
~51,000 additional acres for suitable WV northern flying squirrel habitat
+ ~156,000 acres of Indiana bat primary ranges.
~209,500

Alternative 2 would affect the pool of potential timber base more than any of the other alternatives. However, since the resulting ~344,000-acre pool would exceed the 331,000 acres required for the timber base, there would be no restriction on the timber base allocation of the *Forest Plan* by Alternative 2. This alternative would not substantially affect the Forest's ability to conduct timber harvest or manage the acres projected in the *Forest Plan*.

Just as under the Proposed Action and Alternative 1, no past, present, or reasonably foreseeable future programmatic actions on MNF lands or on private lands are known that would substantially affect the pool of acres of the potential timber base. However, the implementation of site-specific actions is likely to result in cumulative effects to the 344,000-acre timber base. The Forest has, and is expected to continue to apply site-specific mitigation measures as appropriate to protect various resources. The actual acres protected or avoided would not be the same for every project and would be determined at the site-specific level. For example, as under the other alternatives, acres may effectively become unavailable for timber harvest because of vegetation retention in riparian areas, but the percentage of acres potentially unavailable would not be as great as described for the other alternatives. This is because the prohibition of timber harvesting on 158,000 acres of Indiana bat habitat (and the 2-30% that could be reserved for riparian protection) has already been accounted for in the above determination. Reservation of 2-30% for riparian protection may still occur in areas outside five-mile radii of Indiana bat hibernacula. All alternatives would be consistent with pertinent laws.

MINERALS

AFFECTED ENVIRONMENT

Beneath some NFS land, the mineral resources are owned by private entities. Under other NFS land, mineral resources are federally owned. The *Forest Plan* recognized the possibility that private mineral owners could choose to exercise the right to develop their mineral resources, and outlined procedures for accommodating such proposals (*Forest Plan* forest wide standards/guidelines, 2800 E, p.91; 2800 D, p.90; Appendix K Amendment 4, p. K-9).

Forest Goal

The *Forest Plan* identified the goal of keeping primarily energy mineral resources available for exploration and development consistent with other appropriate resource uses and protection of the environment (*Forest Plan*, p. 38).

Projected Outputs

The *Forest Plan* identified items to track that indicate progress toward achieving the *Forest Plan* mineral goal. These included Federal mineral acres available for exploration with surface occupancy and mineral permits or leases issued (*Forest Plan* p. 42). The *Forest Plan* also identified the need to monitor land available for mineral development (*Forest Plan* p. 254). The *Forest Plan* was amended in 1992 (Amendment #4) to identify lands available for oil and gas leasing, including the identification of acres federally owned oil and gas available for natural gas exploration and development (USFS Sept. 30, 1991. *DN and FONSI, Oil and Natural Gas Leasing and Development*, p. 11). This analysis addresses the land available for mineral leasing, exploration, and development.

Mineral exploration and development has occurred on the MNF for decades. Exploration and development of coal and natural gas resources have the greatest potential to be affected by proposed standards.

Coal Resource

Past Coal Mining

Underground coal mining occurred within the boundaries of what is now National Forest before these lands were designated as the MNF. Mining for privately owned coal under MNF land continued into the early 1990s. Surface coal mining occurred from late 1940s through the 1950's. The MNF has acquired some lands that were surface-mined prior to becoming NFS land. Coal mining requires land clearing and earth disturbance to construct haul roads, to develop openings for underground mines, to remove soil and rock to surface mine, or to develop coal processing or loading facilities. Clearings made from past coal mine developments exist, and are shown on Forest vegetation cover type maps (see CDS records).

Future Coal Mining

The *Forest Plan* projected there may be a desire to lease and develop federally owned coal, especially coal lying adjacent to privately owned coal slated for extraction. Whether or not federally owned coal would be leased and the conditions of development would be decided on a case-by-case basis after appropriate environmental analysis (*Forest Plan*, pp. 17 and 90). No one has expressed a serious desire to lease and develop federally owned coal within the Forest since the *Forest Plan* was implemented. Active coal mining on the MNF ceased in the early 1990s, and no coal mine permit applications are pending or known.

Coal resources underlying NFS lands are scattered and would be costly to develop due to the geologies involved. At current and foreseeable coal prices, the MNF does not expect to see near-term significant coal mine development. However, should private coal owners develop their coal, it would most likely involve underground (drift) mining methods. Such development would be expected to include 2-12 acres of MNF lands cleared or disturbed for an underground mine site and several additional acres for a haul road, depending on road length.

Natural Gas Storage

A 50,000-acre natural gas storage field exists beneath the MNF in the Middle Mountain-Glady area. This storage field is authorized by the "Glady Gas Storage Agreement," which is effective from 1963 until 2013, and is likely to be re-issued. The Agreement grants the gas storage operator the rights to use and occupy NFS land within the bounds of the storage field to construct, operate, maintain, replace, abandon, and remove wells, pipelines, and roads for the purposes of gas storage. Land clearing for gas well sites (1-2 acres each), gas pipelines, and access roads required for this field development are reflected in Forest vegetation cover type maps. Recent gas field storage capacity expansion has cleared about one additional acre at each of 3 well sites. Future expansion of and clearing within the Glady gas storage field is not anticipated.

Natural Gas Resource

The decision to implement *Forest Plan* Amendment #4 resulted in ~388,000 acres being identified as available for natural gas exploration and development (USFS Sept. 30, 1991. *DN and FONSI, Oil and Natural Gas Leasing and Development*, p. 11). This decision recognized that some standards to protect threatened and endangered species made small areas unavailable for surface occupancy by gas operations (roads, well sites and pipelines) (USFS. August 15, 1991. *EA Oil and Gas Leasing and Development*, pp. 2-27 through 2-28). It also recognized that avoiding small areas and directionally drilling for gas (drilling at an angle from the surface to a target rock unit that is not directly below the well surface location) may cost gas operators more, but as long as the areas in which surface occupancy was prohibited were no larger than about 640 acres (1 square mile), the natural gas could still be discovered and produced, thus would be available (USFS. August 15, 1991. *EA Oil and Gas Leasing and Development*, pp. 3-50).

Past Natural Gas Activity

Natural gas exploration and development in the MNF began in the 1950s. Within the Forest Proclamation Boundary, between 40 and 50 producing or capable-of-producing gas wells exist. For each, 1-4 acres has been cleared for the well site. Additionally, just over 100 miles of natural gas pipeline and about 12 miles of access road exist. Total clearing for these facilities, including gas well sites, is about 620 acres (USFS. Aug. 15, 1991 EA, Oil and Gas (O&G) Leasing and Development, MNF, Appendix C; Cabot Oil and Gas Corporation Gas Wells Proposal EA, 1997; Thornwood Gas Pipeline EA, September 1995). Twenty-five of these wells and associated facilities, including the 34-mile long Thornwood Gas Pipeline, are on MNF land.

Future Natural Gas Activity

Reasonably foreseeable gas development was projected and described in general terms in May 1990 (USFS. Aug. 15, 1991 EA, O&G Leasing and Development, MNF, Appendix C, and Bureau of Land Management report "Reasonable Foreseeable Development Scenario for Natural Gas within the MNF, WV, 1990-2000", May 1990). This general projection (see paragraph below) still reflects expected gas development over the next 10 years, even with recent increased interests in MNF natural gas deposits as drilling for small gas pockets has become more economical. These disturbed-acreage estimates for the MNF are reasonable because 1/4 to 1/2 of all projected gas development could occur on private land within the proclamation boundary, as is the current situation. Additionally, recent advances in directional drilling technology, described above, allow less land clearing and road and pipeline construction than older methods, which would further reduce the projected clearing amounts.

The MNF has approved plans to fully develop the Horton Gas Field. Directional drilling is proposed so 2-3 wells could be located on a single pad to reduce forest and soil disturbance. The proposal includes 22 new wells on 11 pads (8 new pads and 3 existing pads) to be drilled over 5 years with approximately 33 total acres of disturbance. Several other lessees are considering additional well development within existing gas fields, and some exploratory gas drilling also may occur. Planned and potential gas developments over the next 10 years are expected to involve:

- Clearing about 140 acres for 68 gas well sites; each site approximately 2 acres.
- Clearing about 138 acres for approximately 19 miles of new road to access projected well drilling.
- Clearing about 497 acres for 82 miles of gas pipeline from an estimated 43 producing wells (out of the 68 drilled wells); Rights-of-way may be up to 50-ft wide.

It is likely that some of the 68 wells will not yield gas. Consequently, an estimated 50 acres may begin reverting back to forestland shortly after drilling. Cleared areas from producing wells will remain open, supporting herbaceous vegetation, throughout gas production of probably up to 30 years.

Geophysical Exploration

The MNF has authorized seismic exploration for natural gas, typically including shot hole and vibroseis methods, by issuing a temporary special use permit or other geophysical prospecting permit. Each permit application undergoes a site-specific analysis, which includes a biological evaluation (BE) of the effects of the proposed prospecting on threatened, endangered, and sensitive species. When a BE indicates an effect to threatened and endangered species, the project has been subject to mitigation needed to protect them. This has most commonly resulted in skipping detonation of shots on segments of the proposed prospecting lines. As long as skipped segments are relatively short (no more than several thousands of feet) with most of the line still being shot, and geophones or listening devices can be placed on the skipped segments, there has been no known loss or compromise of data on potential subsurface natural gas traps.

METHODOLOGY

Several key assumption listed below were used to focus the effects analysis.

1. Private minerals would remain available consistent with deed and law as proposed standards under all alternatives would not change private mineral owners' rights to explore for or develop their minerals.

2. Forest mineral resources include commercial quantities of coal, natural gas and limestone; and limited amounts of iron, silica, and gravel (*Forest Plan*, p. 5). Proposed standards under all action alternatives could reduce the availability of these mineral resources. However, since limestone, iron, silica, and gravel generally come from private land and other areas and will likely continue to do so, proposed standards are not likely to generate substantial changes to or concerns about the availability of these resources on NFS land and will not be addressed in detail here.
3. Operation and maintenance of the Gladys Gas storage field would continue. Since Columbia Gas has not indicated additional need for expansion of the storage field, it is unlikely that new, earth disturbance and felling trees would be proposed in threatened and endangered habitat. However, if any expansion would be proposed, consultation with USFWS would determine any needed mitigation.
4. Existing *Forest Plan* standards for gas development reduce the risk of chemical and physical disturbances in caves to acceptable levels, and proposed standards would not change these practices (*Forest Plan*, pages 52, and 230-234; various Oil and Gas Leasing and Development decision documents and analysis records, including Decision Notice and Finding of No Significant Impact, Oil and Gas Leasing and Development, 9/30/91, pages 15, 17, and 18, and "Issues, Concerns, and Opportunities Not Addressed in the Analysis, July 1991, pages 8-11).
5. The addition of small-whorled pogonia and VA spirea and their zones of influence (320 meters or about 1040 feet) may increase gas drilling costs because directional drilling may be required to avoid their zones of influence. However, adding these species and their proposed standards would not change the availability of the gas resource. Because these species' standards would not change gas availability for exploration and development, and they are the same for all alternatives, the effects are not discussed within each alternative.

Proposed standards, especially Indiana bat and WV northern flying squirrel standards, contained within each alternative were examined to determine their potential to preclude exploration for and development of mineral resources, which would make them unavailable.

DIRECT & INDIRECT EFFECTS

Proposed standards may affect exploration and development of federal coal and natural gas in the ways explained below. Only standards that may affect mineral resources, and their expected effects are discussed.

No Action

Federal Coal & Natural Gas

No one has expressed a serious desire to lease and develop federally owned coal within the Forest since the *Forest Plan* was implemented. However, if they did, exploration and development of federal coal would be subject to further analysis and mitigation for threatened and endangered species (*Forest Plan*, p. 17). The outcome of such an analysis could be provisions for threatened and endangered species precluding exploration and development of federal coal within threatened and endangered habitat, especially WV northern flying squirrel "occupied" habitat and known Cheat Mountain salamander habitat since these habitats coincide more often with the occurrence of coal than other species' habitats.

The direct and indirect effects of this alternative on natural gas are the same as shown in the Affected Environment.

Proposed Action

Federal Coal

The effects to Federally owned coal would be the same as the No Action Alternative.

Natural Gas

Indiana bat

The standard that would prohibit surface occupancy for mineral operations on Federal minerals at cave entrances, within key areas, or within two-mile radii of maternity colonies would prevent earth disturbance and tree felling to clear land for roads, well sites, and pipelines within these areas (Appendix A, p. 35, Zoological Area standards, 2800, #1). Since key areas around Indiana bat caves add no more than ~2500 acres Forest-wide in which well site, roads, and pipelines would not be allowed, and because no key area would occupy a contiguous block of 640 acres, there would be no expected change to Federally owned gas available for discovery and production from that expected under the No Action Alternative. If maternity sites were identified, on up to ~8,000 acres per maternity colony (the acres included in a 2-mile radius area), roads, well sites, and pipelines would be prohibited--making any natural gas underlying it virtually unavailable for discovery or production in the 2-mile radius area. Since there is a low probability for the discovery of maternity colonies on the Forest (*USFS, September 2001 Revised Biological Assessment*, p. 44), there is little likelihood that substantial areas of natural gas underlying the Forest would become unavailable for discovery or production due to the proposed standard for Indiana bat maternity colonies.

The standard that would prohibit shot detonation and ground vibration within hibernacula or key areas and within two-mile radii of maternity colonies means that in seismic prospecting for natural gas, there would be sections of seismic lines where shots or vibration would be skipped (Appendix A, p. 35, Zoological, 2800, #4). Listening devices, or geophones, would generally be allowed at Indiana bat hibernacula entrances, in key areas, and within two-mile radii of maternity colonies. Avoiding potential impacts to hibernacula and key areas would mean shots and vibration would be skipped, but only on relatively short sections of line that generally should not cause loss or compromise of geologic data. Because prohibiting shots or ground vibration within two-mile radii of maternity colonies could result in a maximum of four miles skipped, there is some chance that data needed to successfully identify gas traps or their location would not be able to be obtained. However, since there is a low probability for the discovery of maternity colonies on the Forest (*USFS, September 2001 Revised Biological Assessment*, p. 44), it is not expected that there would be substantial areas of the Forest unavailable for geophysical exploration. Overall, data from adjacent shots or vibration could be collected by geophones, and areas that must be skipped by shot detonation are generally expected to be small. Therefore, there would be no expected loss or compromise of data on potential subsurface natural gas traps from that expected under the No Action Alternative.

Because tree felling for roads, well sites, and pipelines would generally be considered to be small scale, the standard that would prohibit large-scale tree felling in the primary range between April 1 and November 15 would not apply. Therefore, tree felling for gas operations could occur year-round under most circumstances (Appendix A, p. 15, MP 6.3, 1900, #3). This means that delays to development and production of Federal gas would be no different than the No Action Alternative.

WV northern flying squirrel

The definition of WV northern flying squirrel habitat would change to protect all suitable habitat instead of only areas within ½ mile of captures. Although the new definition would result in more squirrel habitat acres, the 2800 standard would still allow development of Federal gas within squirrel suitable habitat as long as it remains within levels predicted in the USFS. Aug. 15, 1991 EA, O&G Leasing and Development after consultation with the USFWS. This means felling trees to clear land for roads, well sites, and pipelines could be allowed within much of the squirrel's suitable habitat. This would produce no change in federally owned gas available for discovery and production from that of the No Action.

Because proposed standards would allow surface disturbing exploration and development for natural gas in most areas of the Forest similar to that predicted in the *Forest Plan* amendment on O&G Leasing and Development (USFS Sept. 30, 1991. *DN and FONSI, Oil and Natural Gas Leasing and Development*

and, USFS, October 1992. Plan Amendment #4), proposed standards are not expected to be different from Federal oil and gas areas available for leasing, exploration, and development in the No Action Alternative.

Alternative 1

Federal Coal & Natural Gas

The effects to Federally owned coal would be the same as the No Action Alternative. The effects on Federal oil and gas areas available for leasing, exploration, and production would be the same as those shown for the Proposed Action and No Action Alternative. Even though the standard that prohibits large-scale tree felling from April 1 through November 15 would not apply in this alternative, since the Proposed Action standard would not typically apply to gas development anyway because these operations involve small-scale tree felling, the difference in seasonal restrictions between the Proposed Action and Alternative 1 has no bearing on the ability to develop natural gas.

Alternative 2

Federal Coal & Natural Gas

The effects to federally owned coal would be the same as the No Action Alternative. Standards would allow small-scale tree felling, which would include tree felling for roads, well sites, and pipelines associated with gas development at predicted levels, within Indiana bat primary range (Appendix A, 32, Zoological, 1900, #4, and p. 35, Zoological, 2800, #2). The effects on Federal oil and gas areas available for leasing, exploration, and production would be the same as for the Proposed Action and No Action.

CUMULATIVE EFFECTS

None of the alternatives would cumulatively affect management of mineral resources because they would not cause direct/indirect effects that would add to effects of past, present, or reasonably foreseeable actions on NFS or private land. All alternatives would be compliant with applicable mineral laws.

RANGE

AFFECTED ENVIRONMENT

The MNF administers 52 grazing allotments on four Ranger Districts. These allotments comprise ~7,000 acres (<1% of the MNF). No new allotments have been created in the recent past or are expected to be created in the near future. This is because public demand for range allotments is not expected to increase noticeably in the future, and range budgets are not likely to increase if demand increased.

Forest Goal & Projected Outputs

The following goal guides management of range resources: “Maintain open areas of National Forest land for forage, wildlife, and visual purposes” (*Forest Plan*, Goal V, p. 39). The *Forest Plan* projected that an average of 11,700 Animal Unit Months per year would be provided between 2001 and 2010 (*Forest Plan*, Appendix, pp.41-42 and Appendix O). Actual outputs have averaged ~4,600 AUMs per year but remain within the range analyzed in the *Forest Plan FEIS* (USFS 1999 *Monitoring and Evaluation Report*).

METHODOLOGY

The effects that each alternative would have to the MNF’s range program are qualitatively described below. A comparison is made between the number of grazing allotments and AUMs that would be provided if no changes were made to the existing *Forest Plan* versus the number of allotments and AUMs that would be provided if changes in threatened and endangered species standards were implemented.

DIRECT & INDIRECT EFFECTS

No Action

This alternative would not change the Forest's ability to manage range resources as they have been managed in the past (see "Affected Environment"). The *Forest Plan* goal for management of range resources could still be met. Existing grazing allotments still would be available for range management and ~4,600 AUMs still could be provided — unless future, site-specific conditions indicate changes are necessary to resolve resource concerns or address increases or decreases in public demand.

Proposed Action

The Proposed Action is not expected to noticeably alter existing range resources or the MNF's ability to manage such resources:

1. Limiting the development of range resources to existing allotments within the primary range of Indiana bats as proposed would be consistent with existing management (trend information in USFS, 1999).
2. Proposed MP 6.3 and Indiana bat zoological standards reflect a desire to limit forest pesticide and vegetation treatments within the area of influence of Indiana bats, but such standards would not altogether prohibit pesticide use or vegetative treatment. They only would increase the level of scrutiny that pesticide and vegetation management projects may be subject to.

The Proposed Action would not prevent the MNF from achieving the range resource goal; nor change the number of allotments that could be grazed or AUMs provided. The existing 52 grazing allotments still would be available for range management and an average of 4,600 AUMs could still be provided.

Alternative 1

Alternative 1 is not expected to alter range resources or the management of such resources. Alternative 1 would have the same effects to range resource management, existing allotments, and AUM's as described for the Proposed Action; this is because the standards in Alternative 1 that differ from the Proposed Action are not expected to affect range resource management.

Alternative 2

Alternative 2 is not expected to alter range resources or the management of such resources. The effects that Alternative 2 would have to range resource management, existing allotments, and AUM's would be essentially the same as those described for the Proposed Action -- even though the primary range of Indiana bats would be managed under Indiana bat Zoological standards instead of MP 6.3 and commercial timber harvesting would not be allowed.

CUMULATIVE EFFECTS

None of the alternatives would cumulatively affect management of range resources because they would not cause direct/indirect effects that would add to effects of past, present, or reasonably foreseeable future NFS or private actions. Implementation of all alternatives would be compliant with laws that pertain to range management.

RECREATION

AFFECTED ENVIRONMENT

MNF recreation information can be found in the Record of Decision for the *FEIS* for the *Forest Plan* (ROD, pp. 6, 27, 40, and 45). The MNF is the fourth largest National Forest in 20 northeastern states and is within a day's drive of one-third of the United States' population (USFS, 2000). The Forest is perceived

as a special, even unique place (*Forest Plan*, p. 24), and is a recreation destination and major tourism attraction for both in-State and out-of-State residents.

Forest Goal

The following goals guide management of MNF recreation resources: “Manage the spectrum of recreation opportunities that exist on the Forest with an emphasis on recreation activities that require a large land area, such as hiking or hunting, and facilities to support that use” and “Manage the Spruce Knob-Seneca Rocks National Recreation Area...for multiple resource uses” (*Forest Plan*, Goal I and II, p. 37). To accomplish this goal, the *Forest Plan* identified Forest-wide standards to guide recreation management across the Forest and specified standards specifically for each MP.

Projected Use

Because of the Forest’s proximity to metropolitan areas and the recreation opportunities it offers, visitor use was expected to increase over time (*Forest Plan*, p. 41). Monitoring indicates use has remained the same in some areas and increased in other areas. Overall, use seems to be increasing slightly, especially trail use such as mountain bike use, horse use, and in Wildernesses. This trend is expected to continue.

The Forest has been focusing its limited funding on maintaining or reconstructing existing trails. Trail reconstruction and construction combined has averaged 5 miles per year (USFS, 1999) (*Forest Plan*, Appendix O-1).

Recreation Facilities and Opportunities

The MNF provides a range of recreation facilities for its visitors: two visitor centers, 25 campgrounds, 17 picnic areas, numerous trailheads, and over 500 miles of multiple use trails. Visitors value the Forest as a place where they can take part in a full spectrum of recreation opportunities, especially dispersed recreation activities that are not available anywhere else in WV.

Developed Recreation

Developed recreation opportunities (camping, picnicking, environmental interpretation, etc.) are provided at the Forest’s developed campsites, developed picnic areas, and staffed visitor centers. Due to limited budgets, the Forest has not completed new, large recreation construction projects since 1998.

Dispersed Recreation

Dispersed recreation opportunities (driving for pleasure, dispersed camping, picnicking, fishing, hunting, site-seeing, hiking, mountain bike riding, horseback riding, rock climbing, cross country skiing, swimming, canoeing, berry picking, wildlife viewing, nature study, spelunking, and other non-motorized forms of recreation) are provided on MNF roads, in the general Forest environment, and at undeveloped campsites, small picnic spots, trailheads, and trails.

About 1,800 Forest system roads exist on the MNF: approximately 540 miles are open to public motorized vehicle use year round (30% of all system roads on the Forest); 150 miles (9%) open seasonally to public motorized vehicle use; and 1,100 (61%) miles open only to non-motorized uses (USFS, 1999). Innumerable undeveloped campsites and picnic spots have been created by users (usually near water sources), which may accommodate one or several vehicles. Trailhead parking areas provide access to the Forest and generally accommodate five to ten vehicles. Almost all the trails on the MNF provide opportunities for multiple uses (e.g. hiking, mountain bike riding, horseback riding, etc.). The MNF has several caves that are well known in the caving community and have traditionally been explored by spelunkers, eleven, which have been designated as significant caves due in part to their recreational values and/or presence of threatened and endangered species (see Geologist’s cave resource files).

METHODOLOGY

The effects that each alternative would have on the Forest's recreation program are described below. Because there have been no statistical monitoring of the numbers of recreation users, a qualitative description of expected changes in recreation use, facilities, and opportunities are provided for the four alternatives. The amount of trail construction/reconstruction is quantitatively compared.

The following apply to all alternatives:

- Existing recreation facilities will be retained unless site-specific analyses indicate that changing the facility or closing it would benefit a given threatened and endangered species.
- Construction of new recreation sites is unlikely in the short term, unless a significant rise in recreation use were to occur. The extent of construction that may occur over time is unclear.
- Construction of new recreation sites or maintenance of existing facilities could be affected if new areas of influence for threatened and endangered species are discovered (including new hibernacula for Indiana bats).

DIRECT & INDIRECT EFFECTS

No Action

Continued implementation of the existing *Forest Plan* would not change the Forest's recreation management. The No Action Alternative would result in recreation use, facilities management, and recreation opportunities that are similar to those described in the Affected Environment.

The general nature of existing threatened and endangered species standards allows maintenance or construction of recreation facilities to be administered consistent with the protection of known populations and their habitats. For example, public access for spelunking currently is controlled to protect threatened and endangered species (*Forest Plan*, p. 231). It is restricted to seasonal use in some caves that harbor such species and completely prohibited in other such caves.

Under this alternative, transportation routes and public access also are controlled to avoid adverse effects to threatened and endangered species. Under existing standards, managers avoid placing new transportation routes within the areas of influence of threatened and endangered species. Special precautions also are taken before changing the maintenance or use of existing roads that exists within their habitat.

Under existing standards, maintenance of existing developed and dispersed recreation facilities generally is allowed in threatened and endangered species habitat (regardless of the threatened and endangered species habitat they exist within); but restrictions or prohibitions can be imposed if site-specific circumstances indicate that such maintenance would adversely affect these species. For example, the amount of brushing and day lighting (removing limbs that hang over the trail) that could be done to a trail that exists within known Cheat Mountain salamander habitat could be restricted to prevent opening up the canopy so much that it would dry out the leaf litter on the forest floor. Another example could be preventing dispersed camping or picnicking at a site during the nesting season of bald eagles.

Under the No Action, five miles per year of trail construction/reconstruction still could be accomplished. In most cases, construction of developed facilities is not allowed within ½ mile of a bald eagle nest; within 300 feet of known populations of Cheat Mountain salamanders, 320 meters of the four threatened or endangered plants; within 200 feet of caves occupied by VA big-eared and Indiana bats; or ½ mile radius of WV northern flying squirrel capture sites. Similarly, construction of dispersed facilities generally is not allowed within most species' known habitat, but construction may be allowed within WV northern flying squirrel habitat if adequate canopy closure is maintained.

Proposed Action

The Proposed Action would not prevent the Forest from accomplishing the recreation goal or cause substantial programmatic changes in outputs (e.g. recreation use, recreation facilities, or recreation opportunities). Proposed standards are not expected to appreciably affect existing recreation opportunities or maintenance of developed and dispersed sites; they may have some effect on future construction. At the programmatic level, the Proposed Action would not noticeably change existing (1) semi-primitive, non-motorized recreation use, (2) semi-primitive, motorized use, (3) roaded natural use, or (4) trail use. Maintenance or construction of recreation facilities would remain regulated to protect known threatened and endangered species' populations and their habitats. The same variety of recreation opportunities would be provided.

The Proposed Action would have similar effects to recreation resources as the No Action Alternative:

1. Spelunking and public access to hibernacula of endangered bats would continue to be restricted. Proposed standards would not change the period that caves are available for exploring (e.g. caves closed year-round to exploring would continue to be unavailable to spelunkers).
2. Transportation routes and public access would continue to be administered in a manner that would avoid adverse effects to threatened and endangered species. The miles of roads open or closed to public motorized vehicle access under the Proposed Action is not expected to drastically differ from those that were described in the Affected Environment section.
3. Maintenance of existing developed and dispersed recreation facilities would be allowed (regardless of the threatened and endangered species habitat they exist within) unless site-specific circumstances indicate that such maintenance should be delayed or altogether prohibited. For example, changing the boundaries of the Zoological Areas of Indiana bats (to include key areas and lands within two-mile radii of maternity colonies) and WV northern flying squirrels (to encompass "suitable" rather than "occupied" habitat) and managing the primary range of Indiana bats under MP 6.3 standards generally would not affect the Forest's ability to maintain existing facilities that may be encompassed as a result of such boundary changes.
4. Construction of developed and dispersed facilities generally would continue to be prohibited in threatened and endangered species habitat as described under the No Action Alternative. The Proposed Action is not expected to affect the Forest's ability to construct/reconstruct about five miles per year of trail as has been accomplished under the existing *Forest Plan*.

Proposed changes to standards are not expected to adversely affect dispersed or developed recreation opportunities at a programmatic level. However, there could be site-specific implications. The Proposed Action's effects to recreation resources differ from the No Action Alternative in the following ways:

1. Existing MP 2.0, 3.0, and 7.0 lands that are within the primary range of Indiana bats are currently managed for motorized recreation use. Under the Proposed Action, ~50,000 acres of these MPs would be reassigned to MP 6.3--an MP that would emphasize semi-primitive, non-motorized recreation opportunities. Calling for semi-primitive, non-motorized recreation opportunities at the programmatic level would have little if any effect to existing or future recreation sites within the ~500 acres currently assigned to MP 7.0 (e.g. lands within the boundaries of Seneca Rocks developed recreation complexes) or existing facilities within MP 2.0 and 3.0 areas; it could influence the location of future recreation developments. However, given the general nature of the proposed standard, the small percentage of MNF land that could be affected (<6% of the MNF), and the low level of recreation construction expected in the near future, effects would be minor.
2. The Proposed Action could affect future transportation and public access if Indiana bat primary range that is currently designated as MP 2.0 and 3.0 areas (areas that favor roaded natural, motorized recreation use) is reassigned to MP 6.3. This is because MP 6.3 (like MP 6.1) would

emphasize a semi-primitive, non-motorized type of recreation environment instead of a motorized recreation environment (Appendix A, p. 13 and *Forest Plan*, pp. 164-165). Because the amendment would be a program decision, not a site-specific decision, existing transportation and access would not automatically be affected if the primary range were reassigned to MP 6.3; but changes could be proposed in the future to promote semi-primitive, non-motorized recreation. Such changes would require site-specific analysis before they would be implemented.

3. The Proposed Action would change existing standards so that the creation of transportation routes and public access would be discouraged near Indiana bat hibernacula and within their key areas (~2,500 acres)--a larger area of protection than the 200-foot radius that the No Action Alternative provides (Appendix A, p. 38, 7710, #1). This proposed standard isn't expected to affect existing motorized use, but it could affect the development of future motorized recreation opportunities. The effects to future motorized recreation opportunities, however, would be slight: this is because (1) most acres that would be affected are currently assigned to MP 6.1 and are already managed for non-motorized recreation opportunities; plus (2) hibernacula and key areas comprise <0.3% of the MNF so it is unlikely that such conflict would arise.
4. To supplement existing limits on transportation routes and public access within threatened and endangered species habitat, the Proposed Action would add a standard that suggests blocking or obliterating roads and trails that lead to hibernacula to reduce impacts to Indiana bats (Appendix A, p. 38, 7710, #2). The effects of this optional standard are not expected to be great because it would be implemented only if a site-specific analysis found such action would benefit the Indiana bat.
5. A standard would be adopted to ensure actions taken on recreation buildings (e.g. maintenance or destruction of toilets, storage areas, etc.) within six miles of VA big-eared bat hibernacula or maternity sites would not adversely affect VA big-eared bats (Appendix A, p. 6). The effect of such a standard could be (1) a slight increase in cost of implementing a project (e.g. if surveys of buildings were needed to inspect for VA big-eared bat use) and (2) delayed implementation of a project if the only way to avoid adverse disturbance to VA big-eared bats is to implement during the VA big-eared bats' hibernation period. However, these effects are not expected to be substantial and could occur under the No Action too since existing threatened and endangered species standards allow maintenance or construction of recreation facilities to be administered consistent with the protection of known populations of threatened and endangered species and their habitats.
6. The Proposed Action would create a standard requiring all roost trees of Indiana bats be retained (Appendix A, p. 8). This standard could affect existing recreation use and maintenance of facilities. If a roost tree is found along an existing dispersed or developed site, the facility may have to be seasonally closed or, in the case of a trail, rerouted to avoid adverse effects to Indiana bats. If such action was taken, revenue may be lost during the time a facility was closed or use may decline during the time a trail was rerouted; and it would also cost money to reroute a trail. However, the chances of roost trees being found along or within an existing facility or trail is small: existing developed sites comprise only a fraction of the MNF and few roost sites have been located on the MNF to date (personal communication with Dan Arling, Forest Wildlife Biologist, May 2002).
7. Construction of developed and dispersed facilities would be prohibited at the entrance of hibernacula and within the key area of Indiana bats (Appendix A, p. 32)-- whereas the No Action Alternative only would prohibit such construction within Indiana bat hibernacula and a 200-foot radius of the hibernacula. Limiting the type and amount of construction that can occur within the key area of the Indiana bat could preclude future recreation sites from being built in these areas. However, programmatic effects would be minimal since key areas would make up less than 0.3% of the MNF (~2,500 acres), and adequate MNF acres exist outside key areas to build facilities.

8. Suitable habitat for WV northern flying squirrels would be managed consistent with the squirrels newly amended recovery plan (Appendix A, pp. 11 and 39). Construction of large-scale developed facilities would be prohibited within the squirrel's suitable habitat (Appendix A, p. 40). Limiting the type and amount of construction that can occur within their suitable habitat could preclude future recreation sites from being built in these areas, but the effect is expected to be minimal since the Forest's short and long-term recreation strategy is to emphasize dispersed recreation activities. No large-scale development (except in the National Recreation Area) is expected in the near future (Whetsell, personal communication, 4/14/02).
9. Construction of dispersed facilities would be allowed within WV northern flying squirrel habitat (if consistent with their management), but the area impacted by this standard would be based on guidelines identified in the *Appalachian Northern Flying Squirrels' Recovery Plan (Updated)* instead of a ½ mile radius of known squirrel capture sites (Appendix A, p.40). The effects of this are expected to be minimal and consistent with those of the No Action except for location.

Alternative 1

Alternative 1 would not prevent the Forest from accomplishing the recreation goal or cause substantial programmatic changes in outputs (e.g. recreation use, recreation facilities, or recreational opportunities). The effects that Alternative 1 would have to recreation resources would be about the same as described for the Proposed Action. The main difference in recreational effects being that seasonal restrictions on tree felling for large-scale maintenance or construction of recreation sites would not apply under Alternative 1.

Alternative 2

Alternative 2 would not prevent the Forest from accomplishing the recreation goal or cause substantial programmatic changes in outputs. Recreation resource effects of Alternative 2 would be similar to those of the Proposed Action. The main differences are (1) Alternative 2 would have recreation sites within the primary range of Indiana bats be managed under Indiana bat Zoological standards instead of MP 6.3 standards; (2) tree felling for large-scale recreation maintenance or construction would not be seasonally restricted; and (3) commercial timber sales could not be used within Indiana bat habitat to remove trees from new recreation sites. None of these differences are expected to have substantial adverse effects to recreation resources.

CUMULATIVE EFFECTS

As previously described, the No Action Alternative would not have direct/indirect effects on the existing management of the Forest's recreation resources. Therefore, it would not contribute cumulative effects. The changes to threatened and endangered species standards proposed under the action alternatives could directly/indirectly affect management of recreation resources. However, none of the action alternatives are expected to bring about adverse cumulative effects to MNF's recreation resources because (1) the action alternatives' direct/indirect effects to recreation resources at the programmatic level are expected to be small; and (2) no past, present, or reasonably foreseeable future actions on NFS or private lands are known that would noticeably affect recreation resources at the programmatic level. Recreation resources would continue to be preserved under all alternatives, although mitigation measures may be needed at certain sites to ensure compatibility with threatened and endangered species management. All alternatives would be compliant with NFS recreation regulations and applicable laws.

LANDS MANAGEMENT PROGRAM & SPECIAL USE

ADMINISTRATION

AFFECTED ENVIRONMENT

Lands Management Program

The MNF originated in 1915, when 7,200 acres were acquired in Tucker County.

Forest Goal & Projected Output

The following goal is used to guide management of the MNF's Lands Program: "Improve the efficiency and effectiveness of National Forest Administration through land acquisition, exchange, or donation" (*Forest Plan*, Goal X, p. 39). To obtain this goal, it was projected that between 1,200-2,000 acres would be acquired each year between 1986 and present (*Forest Plan*, p. 42 and Appendix O-2).

Most land of the MNF was purchased between 1915 and 1930. The majority of these lands were acquired via direct purchase with occasional parcels being added by exchange and donations. The primary reason for exchanges is to obtain privately owned land located within otherwise-large blocks of MNF land; for protection of threatened, endangered, or sensitive species and their habitats; preservation of heritage resources; conservation of riparian areas; and/or maintenance of other unique resources. Historically, exchanges have been a minor component of landownership adjustments and result in little net change to Forest acreage (USFS, 1999).

Special Uses

Many uses of NFS land by other entities (public or private) are administered under a National Forest management activity called Special Uses. Most proposed uses require an authorization called a Special Use Permit. The MNF administers approximately 300 Special Uses including roads that provide access to private land; State road rights-of-way; water systems; utility lines; communication sites, organizational camps, outfitter/guide activities, ski trails, etc. These uses occur throughout the Forest. Proximity to threatened and endangered species habitat currently exists and is possible in the future as new locations of known threatened and endangered species are discovered and as new special uses are requested.

Forest Goal & Projected Output

The following goal is used to guide management of special uses of the MNF: "Permit use of National Forest land by others, under special use or lease authorities, that is compatible with National Forest goals and objectives and will contribute to the improved quality of life for local residents" (*Forest Plan*, Goal XIV, p. 39). No outputs were projected (*Forest Plan*, pp.41-42 and Appendix O).

METHODOLOGY

The effects that the four alternatives would have to management of the lands and special uses programs are described below in qualitative terms. The lands that would receive priority for purchase or exchange under the No Action Alternative are compared with those that would receive priority under the action alternatives. Also, the guidelines for processing and administering special uses under the existing *Forest Plan* were compared with the guidelines for processing and administering special uses that would be implemented under the action alternatives.

The following apply to all alternatives:

- Legal rights of others to use NFS lands (e.g. for access to private lands) will be granted consistent with deed and law because no alternative would change private rights.

- Future land purchases and exchanges and existing and new special uses (other than by legal right) would be managed in a way so as to minimize, or altogether prevent adverse effects to threatened, endangered, and proposed species.

DIRECT & INDIRECT EFFECTS

No Action

The No Action Alternative would not change existing management of the Forest's lands program or administration of special uses. Private lands or interests to lands would continue to be acquired and exchanged as specified in the *Forest Plan* (pp. 88-89 and 94-96, 112, 113, 124, 138a, 150, 159, 161, 180, 181, 188a, 190, 195, 196, 203, 204, 208, 209, 213-214, 225, and 227). Priority would still be given to acquire lands or rights needed to protect or reestablish threatened or endangered species (*Forest Plan*, p. 94). Acres of lands acquired and exchanged would be similar to those in the past.

The No Action Alternative would permit uses of NFS land by others (under a special use permit or other instrument) that are compatible with National Forest goals and objectives and that contribute to the improved quality of life for local residents (*Forest Plan* goal, p. 39). The legal rights of others to use NFS lands (such as for access to private lands) would be granted consistent with deeds and regulations.

Proposed Action

The Proposed Action is not expected to noticeably change the Forest's programmatic ability to improve the efficiency and effectiveness of National Forest Administration through land acquisition, exchange, or donation (*Forest Plan* goal, p. 39); nor is it expected to change outputs (the amount of private lands or rights to lands that would be acquired or exchanged). The Proposed Action is similar to the No Action Alternative in that priorities for land acquisition or exchange would be influenced by MNF direction to protect or acquire threatened and endangered species habitat (*Forest Plan*, p. 94). NFS lands within the areas of influence of threatened and endangered species would not usually be available for exchange.

The Proposed Action is different from the No Action Alternative in that unsuitable acres within "occupied" WV northern flying squirrel habitat could be exchanged under the Proposed Action but not under the No Action Alternative. Also, the Proposed Action would identify additional and/or different acres for the management of Indiana bat and WV northern flying squirrel habitat thus changing the acres that may be desirable or undesirable for purchase or exchange.

Neither alternative would make a site-specific determination as to which lands would be purchased or exchanged. For example, if a site proposed for exchange were found to have an Indian bat maternity colony, the likelihood that the site would be retained would be the same under the Proposed Action as under the No Action Alternative. As land proposals are received and budgets allow, site-specific evaluations would be conducted to decide which lands would be purchased or exchanged.

As to the administration of Special Uses, the Proposed Action would cause little change in the way the Forest permits use of NFS land by others, under special use or lease authorities. Like the No Action Alternative, uses still would be required to be compatible with MNF goals and objectives and contribute to the improved quality of life for local residents (*Forest Plan* goal, p. 39).

The following examples support the conclusion that programmatic effects of Proposed Action on special use management would be similar to the effects of the No Action Alternative:

1. The Proposed Action would allow existing permits to be renewed unless site-specific circumstances indicate that ongoing use would be adverse to threatened and endangered species or the use is otherwise prohibited by regulation. This is similar to the No Action Alternative because page 89 of the existing *Forest Plan* states: "Existing special uses which are not compatible with National Forest objectives, as determined by the *Forest Plan* or Agency policies, will be phased out." Under

both the No Action Alternative and Proposed Action, mitigation may be incorporated into a special use permit to insure adverse effects are limited or avoided.

2. The Proposed Action would discourage use of pesticides within MP 6.3 areas (Appendix A, p. 16) and Indiana bat Zoological Areas (Appendix A, p. 32), but would not preclude it. Just as under the No Action Alternative, pesticides could be used if a site-specific analysis deemed such use was necessary to address site-specific conditions along special use power lines, pipelines, roads, etc.
3. The Proposed Action would prohibit special use permits from being issued within the hibernacula and 200 feet around the hibernacula of VA big-eared bat and caves that serve as hibernacula for Indiana bats (Appendix A, pp. 26 and 35). The effects would be similar to the No Action because few permits have been requested for caves that harbor VA big-eared bat or serve as hibernacula for Indiana bat, and those that have been requested were denied under existing direction to protect habitat essential to threatened and endangered species. The Proposed Action would simply clarify and implement a prohibition that is allowed by the existing *Forest Plan*.
4. The Proposed Action would add standards to the *Forest Plan* that state special use permits would be allowed within key areas, within two-mile radii of maternity colonies, and the primary range of Indiana bats only if they are compatible with Indiana bat management (Appendix A, pp. 22 and 35). The effects of such standards are similar to those of the No Action Alternative since the existing *Forest Plan* already allows special use authorizations to be denied if they would adversely affect threatened and endangered species (pp. 84 and 88). However, with the creation of MP 6.3 and expansion of Indiana bat Zoological Area boundaries, about 158,000 acres (~17% of the MNF) would be defined up front in the planning process as land managed specifically for Indiana bats (Appendix A, pp. 13 and 29) (see #6 below for effects).
5. The Proposed Action would limit special use permits within WV northern flying squirrel habitat to those that are compatible (or otherwise required by law) with WV northern flying squirrel management. The effects of such a standard are similar to the No Action Alternative because the existing special use standard for MP 8.0 areas states – “Most special uses are not compatible with this Management Prescription” (*Forest Plan*, p. 203). However, these limitations would be applied to different acres because the land that would make up Zoological Area 832 would be changed to suitable, rather than “occupied,” WV northern flying squirrel habitat (Appendix A, p.39)(see #6 below for effects).
6. Managers are likely to question the need for, or appropriateness of some special use permits on acres that are not currently designated for Indiana bat and WV northern flying squirrel management. This, at least in the short term, may somewhat increase the (1) time needed to respond to requests about, and applications for Special Uses; and (2) cost of administration, especially if more frequent monitoring is conducted to ensure authorized uses within MP 6.3, Indiana bat Zoological Areas, and WV northern flying squirrel Zoological Areas don’t cause adverse effects to threatened and endangered species. However, just as under the No Action Alternative, if sound reasons exist for allowing a particular use within the areas of influence of threatened and endangered species (especially the Indiana bat and WV northern flying squirrel), and such use was not likely to adversely effect threatened and endangered species, a permit could be issued or an expiring permit renewed. Proposed standards are not expected to change the type of documentation (Decision Memo, Decision Notice, Record of Decision) necessary to satisfy NEPA requirements.

Alternative 1

Alternative 1 would not noticeably affect management of the MNF’s lands and special uses programs. The effects would be the same as described for the Proposed Action, even though some standards differ.

Alternative 2

Alternative 2 would not noticeably affect management of the MNF's lands and special uses programs. Its effects would be almost identical to those of the Proposed Action, even though their standards differ. This is because standards that have the potential to affect lands and special uses management are very similar between the two alternatives. The only difference is that the primary range of the Indiana bat would be guided by Indiana bat Zoological Area special use standards instead of the MP 6.3 special use standard because no land would be managed as MP 6.3.

CUMULATIVE EFFECTS

Over time, implementation of any of the alternatives may lead to the acquisition of additional threatened and endangered species habitat since the MNF would continue -- on a willing-seller willing-buyer basis -- purchasing lands that support known populations of, or provide habitat for, threatened, endangered species. As to land exchanges, implementation of the existing *Forest Plan* has resulted in ~146,000 acres (~16%) of MNF lands being considered unavailable or undesirable for exchange (e.g. Wilderness designation plus known threatened and endangered species populations or habitat). In time, under the No Action Alternative, 100,000s of acres of WV northern flying squirrel "occupied" habitat would likely be identified, causing additional acres to be undesirable for exchange. Under the action alternatives, about another 284,000 acres would be unavailable or undesirable for exchange (those acres designated MP 6.3 and Zoological Area habitat for Indiana bats and Zoological Area habitat for WV northern flying squirrels). The Forest is not aware of any reasonably foreseeable future actions or designations that would make more areas unavailable or undesirable for exchange. Therefore, the cumulative effect of past, present, and reasonably foreseeable future actions for the action alternatives on the lands adjustment program is that ~39% of the MNF would potentially be unavailable or undesirable for exchange (note: this is based on the assumption that the primary range of Indiana bats would not normally be exchanged, regardless of whether it is designated as MP 6.3 or Zoological Areas for Indiana bats). This is not expected to prevent the Forest from attaining the Forest's lands program goal.

Because the alternatives would have little to no direct or indirect effect on special uses management, none of the alternatives are expected to contribute cumulatively to past, present, or reasonably foreseeable future actions (either on NFS or private lands). Proposed standards would be compliant with the various laws and legal precedence governing use of public land.

HERITAGE RESOURCES

AFFECTED ENVIRONMENT

Heritage resources on the MNF represent the remnants of human activities on the Forest spanning the prehistoric and historic periods. Native American resources date from the Paleo-Indian period (c. 14,000 BP) to the time of European contact. Historic period resources encompass exploration, settlement, the Civil War, and the post-Civil War period of economic expansion, ensuing environmental exploitation and degradation, and post-expansion collapse. Historic resources also relate to the early history of the MNF, and the reforestation of the region by the Civilian Conservation Corps (CCC). About 43% of the MNF has been surveyed, resulting in the identification of ~1,800 sites.

Forest Goal & Projected Outputs

The Forest goal is to "Protect natural and cultural resources of the forest...from damage or degradation" (*Forest Plan*, p. 40). No outputs for heritage resources were identified.

DIRECT, INDIRECT, & CUMULATIVE EFFECTS OF ALL ALTERNATIVES

All alternatives would allow for the protection of heritage resources (*Forest Plan* goal, p. 40). They would not cause adverse or substantial changes to the heritage resource program. Implementing proposed standards generally would not cause adverse effects to significant or potentially significant archaeological sites or affect the manner in which heritage sites are managed. However, cases may arise within threatened and endangered species habitat where vegetation management is restricted but vegetation needs to be altered to protect heritage resources. In such cases, however infrequent, site-specific decisions would need to be made. Implementation of proposed standards would be compliant with requirements in the National Historic Preservation Act of 1966, as amended (16 USC 470) and Archaeological Resources Protection Act of 1979 (16 USC 470).

SPECIAL OR UNIQUE AREAS

AFFECTED ENVIRONMENT

MP 8.0 was set up for the preservation of unique ecosystems or areas for scientific or recreation purposes; areas to conduct research; and the protection of unique areas of national significance. These areas are scattered throughout the Forest and vary in size. Their unique characteristics are recognized by a variety of administrative designations: scenic areas (areas of outstanding beauty which require special management to preserve these qualities; botanical areas (contain specimens or groups of plants in plant communities which are significant because of the form, color, occurrence, habitat, location, life history, arrangement, ecology, environment, and variety); experimental forests (Fernow Experimental Forest = ~5,000, and Greenbrier Cooperative Area, ~800 acres); recommended research natural areas (13 areas have been proposed to provide an opportunity to study plants, animals, or ecosystems in an undisturbed condition. Such research often provides background or base data for other studies); geologic areas; national natural landmarks (areas that preserve a variety of significant ecological and geological natural areas, which, when considered together, illustrate the diversity of the country's natural heritage); and zoological areas (area that embraces animals, animal groups, or animal communities which are natural and important because of occurrence, habitat, location, life history, ecology, environment, rarity, or other features—such as Indiana bat, WV northern flying squirrel, and VA big-eared bat).

Forest Goal & Projected Outputs

Goal XVI guides management of these areas in that it states: “Protect natural and cultural resources of the Forest and the health and safety of visitors from damage or degradation (*Forest Plan*, p. 40). The *Forest Plan* did not project outputs for management of such areas.

DIRECT/INDIRECT & CUMULATIVE EFFECTS OF ALL ALTERNATIVES

None of the alternatives would hinder the Forest's ability to manage or protect unique or special areas, and in the case of endangered bats and the WV northern flying squirrel, action alternatives would improve the Forest's ability to protect and manage for the recovery of these species (see Threatened and Endangered Species effects in this EA). Even considering past, present, and reasonably foreseeable future actions, none of the alternatives are expected to result in substantial adverse effects to unique or special areas, and some effects would be beneficial (see the Threatened and Endangered Species effects, Heritage Resource effects, Visuals effects, and information in the project file). All alternatives would be compliant with laws applicable to management of such areas.

SCENERY

AFFECTED ENVIRONMENT

A diverse array of visual resources is present across the MNF including a rich variety of vegetation, the presence of rock forms in significant and obvious locations, and the interest added by the many free running streams (*Forest Plan FEIS*, pp. 3-5). Only a relatively small portion of the MNF shows signs of modification by people (e.g. utility corridors, roads, gas developments, and timber harvests). From the most highly used travel ways and use areas, from the mid to background distances (1/4 to 1 mile and beyond), the Forest appears natural due to its continuous forested canopy with only occasional openings caused by savannah stands and more recent timber harvest. Small savannah or wildlife openings are found in some drainages; such openings are usually dominated by grasses, wildflowers, and/or ferns and have scattered trees, features that add visual variety primarily at foreground distances.

Because of the logging and fires that occurred at the turn-of-the-20th century, forests on both NFS and private lands are primarily 60 years old or older (only ~11% of the MNF is <59 years old). Currently, most forest overstories are dominated by light loving species such as black cherry, white ash, red maple, and a variety of oaks. However, shade-tolerant species are overtaking the understory, and they are expected to pose a problem in perpetuating desired intolerant species in the future (“Forest Types and Age Class Diversity” section and *Forest Plan FEIS*, pp. 3-15 and 3-17). White pine and Eastern hemlock are also found within MNF and private forests. Spruce at higher elevations of the MNF provides visual variety, especially along the Cheat Mountain range. White pine is found in the southern end of the State. These evergreens provide foreground and background visual variety.

Forest Goal & Projected Outputs

A specific goal was not identified to guide Forest management of visual resources, although the Watershed Protection and Fire, Insect, and Disease Protection goal addresses it generally: “Protect natural...resources of the Forest and the health and safety of visitors from damage or degradation” (*Forest Plan*, p. 40). The *Forest Plan* did not project an output for visual resources.

METHODOLOGY

The effects the alternatives would have on management of or changes in visual quality are described. A qualitative comparison is made between visual quality as a result of continuing implementation of the existing *Forest Plan* versus visual quality that may result under the action alternatives.

DIRECT & INDIRECT EFFECTS

No Action

Management of visual resources are not expected to change beyond what was predicted in the *Forest Plan FEIS*, pp. 4-9, 4-13, 4-23, 4-25, 4-26, 4-30, 4-32, 4-34, 4-39, 4-50, 4-54, and 4-55. The scenery described in the affected environment would persist for some time. Over a long period of time, as undisturbed Forest stands mature, larger trees would be found, vertical variety would be created in stand structure, and evergreens and other late-successional forest types may become more common within MNF (see “Forest Type and Age Class Diversity” effects and *Forest Plan FEIS*, p. 3-17). Similar effects are anticipated to occur within privately owned forests that are not actively managed. As older trees start to die off from natural causes, there may be a negative impact to visual quality in some highly used or viewed areas. On MNF and private lands that are actively managed, visual quality would continue to be impacted by timber harvesting and other vegetation management and road construction or reconstruction (note: harvesting levels and transportation management and development are expected to stay near past averages as described in the “Forest Type and Age Class Diversity” and “Transportation” effects).

Proposed Action

Effects to scenery are expected to be similar to those anticipated for the No Action Alternative and documented in the *Forest Plan FEIS*. Few of the proposed standards would adversely affect visual resources. Most would reduce the visual contrast produced by some form of management activity (especially in the case of WV northern flying squirrel suitable habitat--where little active vegetation management would occur) and, in that regard, would be considered visually beneficial.

The Proposed Action would employ the same visual quality objectives for MP 6.3 as are currently applied in MP 6.1 areas; MP 6.1 currently makes up ~67% of the MNF. Using such standards would not affect visual resources of those acres that are currently assigned to MP 6.1. However, it would programmatically allow for the implementation of (1) lower visual quality objectives on some acres currently assigned to MP 2.0 (<1,000 acres) and MP 7.0 (<400 acres) (*Forest Plan*, pp. 119 and 194) and (2) more restrictive visual quality objectives for some acres currently assigned to MP 3.0 (<52,000 acres)(pp. 131 of the *Forest Plan*). The effects of such changes, however, are negligible since the overriding direction for visual management for all MPs is to manage activities so they blend with the natural character of the landscape, and site-specific analyses would be conducted to ensure projects are designed to meet this standard.

A Forest-wide standard is proposed to monitor snag retention in all cutting units and create snags from larger dbh trees if less than 6 snags per acre exist (Appendix A, p. 7). Proposed retention of snags is the same as an existing MP 6.1 standard that requires all snags in cutting units to be retained (and MP 6.1 currently makes up ~67% of the MNF). Plus, it is similar to an MP 3.0 standard that requires 3-5 snags/acre be retained in cutting units (MP 3.0 areas make up ~20% of the MNF). However, the portion of the proposed standard that would create snags in cutting units without 6 existing snags could cause more dead trees to be viewed in a cutting unit than may have occurred under the No Action Alternative. This could cause an adverse impact to visual quality anywhere on the Forest where cutting is permitted. However, overall, the effect would be small since less than 4,000 to 6,000 acres (~4-7% of the MNF) of timber harvesting is anticipated to occur in any given year (USFS, 2000).

Standards are proposed that would favor shelterwood or two-age regeneration harvests in MP 6.3 over clearcuts (Appendix A, p. 19); uneven-aged methods such as individual and group selection harvests are also likely to be implemented (Appendix A, p. 20). Use of two-age, shelterwood, or uneven-age harvest techniques would be expected to have less effect to visual quality than the clearcut method because less visual contrast would be produced at all viewing distances. This effect is very similar to the effects of the No Action Alternative, as acres regenerated through clear-cutting have declined over the years.

Retaining all snags (dead trees) and at least 5 cull (possibly poorly formed) trees per acre in cutting units located within five-mile radii of Indiana bat hibernacula (MP 6.3) could result in negative visual effects (Appendix A, p.16). However, as mentioned above, snags and cull trees are generally retained in MP 3.0 and 6.1 areas under the No Action Alternative, so change in effects would be limited to the acres within the ~1,000 acres of MP 2.0 and ~400 acres within MP 7.0. Clumps and strips of live trees would be retained in the same cutting units (Appendix A, pp. 19-20) and may reduce the impact of retaining snags and culls because visual contrast would be less noticeable at all viewing distances. Clumps of trees are generally retained in MP 6.1 areas under the No Action Alternative as well.

In areas considered suitable habitat for WV northern flying squirrels, road construction would not normally occur (Appendix A, p. 41). While squirrel habitat is not completely contiguous, this standard would create areas where road construction would not occur (see Transportation effects). The effect to visual quality would be positive as roads introduce contrast between forms and color in the landscape.

The “Forest Type and Age Class Diversity” section of the EA describes the vegetative changes that may occur if the Proposed Action is implemented. Such changes would not cause adverse visual quality effects. Over time, more stand decadence may be observed in Indiana bat Zoological Areas because

vegetation management would be noticeably restricted in these areas, but the acreage would be very small relative to the forest landscape for the Proposed Action (~0.3% of the MNF).

Stricter limits on vegetation management and timber harvesting may be applied to additional acres of the Forest. Such limitations are not expected to reduce harvest levels across the Forest (see Timber Sale Program effects) but would affect where and how often vegetation management and timber harvesting could occur. In suitable squirrel habitat, little management for early or mid-successional habitat would occur; late-successional species (northern hardwoods and spruce) are likely to increase in the overstory and, over the long-term, provide different visual quality than might have been provided under the No Action. However, under the No Action Alternative, future surveys for WV northern flying squirrel would likely have identified additional squirrel populations on the same acres planned for protection under the Proposed Action (see Threatened and Endangered Species section). Resulting visual effects are not expected to be adverse unless widespread mortality occurs (e.g. insect, disease, windstorm, natural aging, etc.), the probability of which is discussed in Forest Type and Age Class Diversity and Forest Health effects.

Alternative 1

The effects of Alternative 1 would be the same as described for the Proposed Action; proposed standards would cause few adverse visual quality effects.

Alternative 2

Alternative 2 is not expected to result in substantial direct/indirect adverse visual quality effects. Effects of Alternative 2 would be the same as the Proposed Action, except no commercial timber harvests would be permitted within the five-mile radius of Indiana bat hibernacula (affecting ~17% of the MNF instead of ~0.3%).

CUMULATIVE EFFECTS

Visual effects of trees aging in WV northern flying squirrel and Indiana bat habitat, in the scope of the next five years (expected completion of plan revision) is not considered a substantial effect. Under all the alternatives, taking no action in WV northern flying squirrel habitat, could, over decades, have an adverse cumulative effect. Over several decades, red spruce is likely to dominate WV northern flying squirrel habitat, spruce may decline and die due to overcrowding, aging of population, air quality, or other factors; this could negatively impact visual quality negatively as spruce trees die.

Promoting oak and northern hardwoods in Indiana bat habitat and allowing conifer to increase in WV northern flying squirrel habitat could cumulatively lead to changes in stand structure and composition, which could lead to changes in visual quality. However, this effect is likely to occur under the No Action Alternative as well as the Proposed Action and Alternative 1 because oaks and northern hardwoods are likely to be promoted on lands assigned to MP 3.0 and 6.1 that would be managed as Indiana bat habitat. Over the long term, and given the importance of spruce to WV northern flying squirrels, spruce would likely increase across the Forest under the No Action and action alternatives. The conifer components of the landscape were considered very desirable in the *Forest Plan* for their added visual variety.

Within the MNF's proclamation boundary, privately owned forests are generally managed for hardwood species by a mix of management methods. The existence of privately owned farms and pasturelands adds visual variety. No past, present, or reasonably foreseeable future actions are known that, in combination with the minor effects of the No Action or action alternatives, would substantially alter visual resources. All alternatives would be compliant with visual quality regulations.

WETLANDS & FLOODPLAINS

AFFECTED ENVIRONMENT

See “Affected Environment” descriptions for “Riparian & Aquatic Resources” and “Soil & Water.”

Forest Goal & Projected Outputs

The Forest goal for management of these resources is to “Protect natural ...resources of the forest...from damage or degradation” (p. 40). No outputs were identified in the *Forest Plan*.

DIRECT, INDIRECT, & CUMULATIVE EFFECTS OF ALL ALTERNATIVES

Implementing proposed standards would not likely result in adverse effects to floodplains or wetlands or change the way in which such resources are managed. Activities have been implemented near or within floodplains and wetlands in the distant past that have adversely affected such resources (such as late 1800 and early 1900 logging activities and associated railroad development); however, recent past, present, and future activities near or within floodplains and wetlands are designed to either improve such resources or avoid adverse effects. Work done for the management of habitat essential to proposed, endangered, and threatened species would be evaluated during a site-specific analysis for effects to floodplains and wetlands, and as is the Forest’s current practice, proposed activities would be required to protect floodplain and wetland values and comply with Executive Order 11988 (floodplains) and Executive Order 11990 (wetlands). Implementation of any of the alternatives would be compliant with Executive Order 11988 (floodplains) and Executive Order 11990 (wetlands).

WILD & SCENIC RIVERS

AFFECTED ENVIRONMENT

Portions of several rivers that flow through the MNF have been considered for Wild and Scenic River designation, but none to date have been officially designated by Congress as Wild and Scenic Rivers. These rivers include the Greenbrier River (including the East and West Forks), Gauley River (including the Cranberry River), Shavers Fork of Cheat, Dry Fork of Cheat, Blackwater, Glady Fork of Cheat, Laurel Fork, Otter Creek, Red Creek, South Branch of Potomac, North Fork of South Branch Potomac, Seneca Creek, Williams River, and North Fork of Cherry (*Forest Plan FEIS*, Appendix D; *USFS Greenbrier Wild and Scenic River Study*; *USFS Gauley River Study*; and *USFS Wild and Scenic River Study Report and Environmental Impact Statement on Twelve Rivers in the MNF*).

Forest Goal & Projected Outputs

A specific goal was not identified to guide management of rivers suitable for designation as Wild and Scenic, but the Watershed Protection goal covers it in general terms: “Protect natural...resources of the Forest...from damage or degradation” (*Forest Plan*, p. 40). Appendix D of the *Forest Plan FEIS* describes the analysis that was done for Wild and Scenic River Areas prior to authorization of the *Forest Plan* and pages 70-71 provide standards for management of rivers potentially suitable for designation. The *Forest Plan* did not project an output for wild and scenic river management.

METHODOLOGY

The effects each alternative would have on the Forest’s ability to manage rivers that are potentially suitable for Wild and Scenic River designation are qualitatively described below. The protection that the existing *Forest Plan* provides to river segments potentially suitable for Wild and Scenic River designation is compared with the protection that the same river segments would receive if proposed threatened and endangered species’ standards were implemented under the various action alternatives.

DIRECT & INDIRECT EFFECTS

No Action

This alternative would not affect management of rivers that are potentially suitable for designation as Wild and Scenic Rivers because no changes to the *Forest Plan* would be made. It would continue to protect natural resources of the Forest from damage or degradation (*Forest Plan* goal, p. 40).

The values that have made certain rivers potentially suitable for Wild and Scenic River designation would continue to be protected through management complying with the General Management Principles specified in Section III – Management of the National Wild and Scenic Rivers Management of River Areas, USIDI-NPS and USDA–UFSF, 09/82 (*Forest Plan FEIS*, Appendix D-5); river segments that have been identified as potentially suitable for Wild and Scenic River designation would be managed so that potential wild classification would not be precluded, until studies are completed. The 5(a) rivers (Gauley and Greenbrier) would be managed similarly until such time that Congress either acts on, rejects, or modifies the proposed action and/or an alternative to it recommended in the study reports, or for three years after the study report recommending designation is submitted to the Congress (*Forest Plan*, p.71).

Proposed Action

The Proposed Action would not affect the Forest's ability to prevent damage or degradation to rivers that are potentially suitable for Wild and Scenic Rivers designation (*Forest Plan* goal, p. 40). Of all the proposed changes to threatened and endangered species' standards, those that suggest that action be taken to improve/expand threatened and endangered species habitat could affect potentially suitable rivers:

1. Determine and implement appropriate habitat management techniques to maintain or enhance populations of threatened, endangered, and proposed species (Appendix A, p.5);
2. Standards that allow vegetation management and timber harvests in key areas, within two-mile radii of maternity colonies, or primary range of Indiana bats (Appendix A, pp. 15, 17-21, 31-32).

These changes are not expected to change the Forest's management of river segments that are potentially suitable for Wild and Scenic River designation (see Affected Environment and No Action Alternative). Standards identified for the Proposed Action do not require actions be taken in or along rivers potentially suitable for Wild and Scenic Rivers. As under the No Action Alternative, a site-specific analysis would be conducted if projects were proposed in or along river segments that are potentially suitable for Wild and Scenic River designation; and measures (e.g. avoidance or mitigation) would be taken to prevent or minimize adverse effects to both threatened and endangered species and potentially suitable rivers. The values (including threatened and endangered species values) that made them potentially suitable would be protected.

Alternative 1

Alternative 1 would not affect the Forest's ability to protect rivers that are potentially suitable for Wild and Scenic River designation (*Forest Plan* goal, p. 40). The effects of implementing Alternative 1 would be the same as those described for the Proposed Action since the few standards that are different from the Proposed Action would not cause different effects.

Alternative 2

Alternative 2 would not affect the Forest's ability to protect rivers that are potentially suitable for designation (*Forest Plan* goal, p. 40). Some Alternative 2 standards (mostly Indiana bat standards) differ from the Proposed Action, but the effects of the standards would essentially be the same as those of the Proposed Action.

CUMULATIVE EFFECTS

Because none of the alternatives would cause direct or indirect effects, none of them would add cumulatively to effects of past, present, or reasonably foreseeable future NFS or private activities. All alternatives would be compliant with the Wild and Scenic Rivers Act of October 2, 1968, as amended.

WILDERNESS

AFFECTED ENVIRONMENT

Five congressionally designated Wildernesses make up nine percent of the MNF (~79,000 acres): Cranberry, Dolly Sods, Laurel Fork North, Laurel Fork South, and Otter Creek Wildernesses. The following goal is used to guide management of these five wildernesses:

Forest Goal & Projected Outputs

“Manage National Forest Wilderness in order to preserve the Wilderness attributes for which the areas were designated” (*Forest Plan*, Goal III, p. 37). The *Forest Plan* projected ~79,000 acres of NFS lands would be managed as Wilderness (*Forest Plan*, pp. 41 and Appendix O).

Management of these acres is guided primarily by standards listed on pages 153-163 of the *Forest Plan*. Vegetation within wilderness has been affected by natural succession, and a wilderness experience has been provided so that there is little evidence of other users and low interaction between users. Facilities of a primitive nature are present in some areas to protect resources and the safety of visitors.

METHODOLOGY

The acres of Wilderness that would be protected and the management that would occur on those acres under the existing *Forest Plan* are compared with those that would occur in Wilderness under each action alternative if proposed threatened and endangered species’ standards were implemented.

DIRECT & INDIRECT EFFECTS

No Action

The No Action Alternative would not affect the management of Wildernesses. Wilderness attributes would continue to be protected for future generations (as mandated by The Wilderness Act of 1964) on the same ~79,000 acres (*Forest Plan* goal, p. 37). Natural ecosystems within Wildernesses would be preserved. Vegetation within wilderness would be affected by natural succession.

Proposed Action

The Proposed Action would not alter the acres managed as Wilderness, change the overall management of Wildernesses, nor prevent the Forest from attaining its goal for Wilderness--wilderness attributes would continue to be protected. Proposed threatened and endangered species standards would not contradict existing wilderness direction in The Wilderness Act, Forest Service policy, or *Forest Plan*.

All ~79,000 acres currently identified as Wilderness (even acres that support populations of threatened and endangered species) would remain assigned to MP 5.0 Wilderness; and MP 5.0 standards would continue to apply. Vegetation within wilderness would continue to be affected by natural succession. A wilderness experience would continue to be provided so there would be little evidence of other users and low interaction between users. Some of the proposed threatened and endangered species’ standards (e.g. standards that call for avoidance/protection of threatened and endangered species habitat and applicable Indiana bat and WV northern flying squirrel standards) may be implemented within Wildernesses; but only if they do not conflict with wilderness attributes or values. Wilderness acres would not be reassigned to

MP 6.3 or 8.0 for VA big-eared bat, Indiana bat, and WV northern flying squirrel management. The Proposed Action would allow all ~79,000 acres of MNF Wilderness to be managed in a manner that preserves the wilderness attributes for which the areas were designated (*Forest Plan* goal, p. 37), even if Indiana bats habitat and WV northern flying squirrel suitable habitat exist within a Wilderness' boundary.

Alternative 1

Like the Proposed Action, Alternative 1 may implement new standards within existing Wildernesses, but implementation would not noticeably affect Wilderness management or attainment of the wilderness goal. The effects would be the same as described for the Proposed Action since the few standards that differ from the Proposed Action (Appendix A, pp. 10, 15, and 32) would not cause different effects to Wilderness management. All ~79,000 acres would continue to be managed as Wilderness.

Alternative 2

Implementing Alternative 2 would not noticeably affect Wilderness management or hinder the Forest's ability to attain the wilderness goal. Even though Alternative 2 proposes some different standards than the Proposed Action (Appendix A, pp. 5, 7, 10, 13-22, 29-32, and 35-36), the effects that Alternative 2 would have on designated Wildernesses would be the same as those described for the Proposed Action. All ~79,000 acres that are currently designated Wilderness would continue to be managed as Wilderness.

CUMULATIVE EFFECTS

None of the alternatives are expected to result in adverse cumulative effects. The No Action Alternative would not have direct/indirect effects on present management of designated Wildernesses; therefore, it would not cause cumulative effects. To the extent allowed by law and the *Forest Plan*, action alternatives may implement new threatened and endangered species' standards within MNF Wildernesses; but their implementation would not noticeably change Wilderness management or hinder the Forest's ability to attain wilderness goals. No past, present, or reasonably foreseeable future actions (on NFS or private lands) are known that would result in adverse cumulative effects to the ~79,000 acres of Wilderness. All alternatives would be compliant with the Wilderness Act of 1964.

ECONOMICS

AFFECTED ENVIRONMENT

Forest goals and outputs for various resources that contribute to local economies are described in the various resource sections of this chapter. The MNF provides direct opportunities for employment for many local people including timber operators, oil and gas developers, construction contractors, and recreation providers, etc. There are indirect employment opportunities created by increases in the economy through the services provided to recreation users (i.e., gas stations, restaurants, etc.) and wood processing facilities. Besides jobs, recreation use brings dollars into the local economy that adds to its health and well-being. Also, the counties encompassing the MNF receive payments from the Federal government to offset the absence of tax revenues from federally owned land within the counties. These payments, administered by the county governments, are used for schools and roads.

DIRECT, INDIRECT, & CUMULATIVE EFFECTS OF ALL ALTERNATIVES

The effects proposed standards would have on mineral development, timber production, recreation use, and other resources are documented in their respective sections of this chapter. None of the alternatives would substantially alter the opportunities for employment or substantially affect payments to county governments from recent levels. This is because the acreage of MNF lands available for activities such as oil and gas leasing, commercial timber production, and recreation use would remain within levels anticipated under

implementation of the existing *Forest Plan* (No Action Alternative). All alternatives would be compliant with existing laws (see minerals, timber, and recreation effects in this chapter).

ENVIRONMENTAL JUSTICE

AFFECTED ENVIRONMENT

Executive Order 12898, dated February 11, 1994, requires each federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations in the United States. There are no known community-identified environmental justice related issues, and recent data indicate none of the counties within the MNF boundary demonstrate ethnic populations or income percentages greater than two times that of the State average (U.S. Census Bureau, Census 2000).

Forest Goal & Projected Outputs

Forest Plan Goal IX states: “Improve the social welfare of citizens through education, training, employment, and public safety programs” and Goal XII provided for maintenance of open communication with the public (p. 39).

DIRECT, INDIRECT, & CUMULATIVE EFFECTS OF ALL ALTERNATIVES

None of the alternatives would pose disproportionately high and adverse environmental, human health, or social effect on counties within the proclamation boundary of the MNF (see effects documented for other resources). All the alternatives would be consistent with Executive Order 12898.